73804-004
WR3500-UM-251
Service Manual

LINEARCORDER MARK 8

WR3500

SERVICE MANUAL
AND PARTS LIST

GRAPHTEC CORPORATION

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_06292

Table of Contents

		Page
1.	CONFIGURATION AND REMOVAL FROM THE OUTER HOUSING	1
1.1	Configuration	1
1.2	Removal from the Outer Housing	2
2.	ASSEMBLY AND DISASSEMBLY	4
2.1	Removing the Pen and Pen Motor	4
2.2	Removing the Power Supply Section	4
2.3	Removing the Servo Amplifier	5
2.4	Removing the Heat Controller	5
2.5	Removing the Chart Driver PCB	6
2.6	Removing the Printing PCB	6
3.	ADJUSTMENT	7
3.1	Pen Perpendicularity	7
3.2	Servo Circuit Adjustment	8
3.3	Heat Control Circuit Adjustment	11
3.4	Amp Unit Adjustment (AL3501, AH3501)	12
3.5	Feed Control Circuit Adjustment	14
4.	BLOCK DIAGRAM	17
4.1	Block Diagram	17
4.2	Power Supply Section	18
4.3	Mother Boards	18
4.4	Servo Amplifier/Pen Motor	19
4.5	Heat Control	20
4.6	Feed Control	21
4.7	Printing Control	22

Page

5.	PARTS LISTS	5－1
5.1	Mainframe (1)	5－1
5.2	Mainframe (2)	5－2
5.3	Mainframe (3)	5－4
5.4	Amp Box	5－5
5.5	Wiring (Mainframe)	5－7
5.6	Mother Board No. 1	5－9
5.7	Mother Board No. 2	5－11
5.8	Power Supply Section	5－14
5.9	Chart Drive (1/2)	5－17
	Chart Drive (2/2)	5－19
5.10	Printing Control (1/3)	5－29
	Printing Control (2/3)	5－31
	Printing Control (3/3)	5－32
5.11	Servo Amplifier	5－37
5.12	Heat Controller	5－41
5.13	Wiring (Amp Box)	5－46
5.14	Mother Board No. 3	5－47
5.15	Amp Unit AL3501	5－50
5.16	Amp Unit AH3501	5－53

1. CONFIGURATION AND REMOVAL FROM THE OUTER HOUSING

1.1 Configuration

The Linearcorder Mark 8 consists of two sections--the mainframe (recorder proper) and the Amp Box. The mainframe consists of the chart paper feed mechanism, pen motor servo amplifiers and other circuitry and operates as a recorder having a fixed sensitivity. The Amp Box section accommodates various types of amplifier units and serves to expand the range of applications of the WR3500.

Three basic types of recorder can be configured of these two sections, as follows.

1 Desk-top Version (WR3500)

The version features a mainframe and Amp Box housed in a single case.

2 Rack-Mounted Mainframe (WR3502)

In this version, the mainframe is provided with rack mounting fixtures.

3 Rack-Mounted Amp Box (WA3503)

In this version, the amp box is provided with rack mounting fixtures.

The outer housing of the recorder will depend upon which of the configurations applies.

1.2 Removal from the Outer Housing

1.2.1 WR3500

Remove the link between the mainframe and the amp box to separate them into two units.

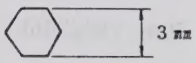
1 Remove the cable connecting the rear of the mainframe to the amp box.

2 Remove the seven screws from the side plate (four 5mm screws on the front and three hex-socket bolts on the side plate).

3 Remove the left and right side plates. This will separate the mainframe from the amp box.

4 Remove the four screws at the top of the amp box and remove the top panel.

The hex-socket bolts should be removed using a 3mm hex wrench.



1.2.2 WR3502

The WR3502 is a rack-mounted mainframe.

1 Remove all cables connected to the WR3502.

2 Remove the screws holding the WR3502 into the rack and then remove the WR3502 from the rack.

3 Remove the four screws from its top and then remove the panel.

1.2.3 WA3503

The WA3503 is a rack-mounted amp box.

Removing the Amp Unit

1 Move the door covering the amp unit mounting screws to the left.

2 Remove the amp unit mounting screws and pull out the amp unit.

Removing the Amp Box

1 Remove all cables connected to the WA3503.

2 Remove the screws holding the WA3503 into the rack and then remove the WA3503 from the rack.

3 Remove the four screws from its top and then remove the panel.

2. ASSEMBLY AND DISASSEMBLY

This section describes the removal of the various sub-sections. When removing these, remove the unit from its outer housing first, as described in Section 1. Assembly is performed by reversing the procedures described below.

2.1 Removing the Pen and Pen Motor

The pen and pen motor are removed by following the procedure below.

1 Remove the two screws holding the operating section to the mainframe top (3mm for the WR3500 and round posts for the WR3502), and then rotate the operating section upward.

2 Remove the pen and pen motor mounting screws (hex bolts for the pen and 3mm screws for the pen motor) and then remove the pen or pen motor.

2.2 Removing the Power Supply Section

The power supply section includes the power transformer, rectifier circuit, regulator circuit and cooling fan. It is removed by following the procedure below.

1 Remove connector P42 of mother board No. 1 (PCB PR3500-01A of the operating section) and connector P25 of the mother board No. 2 (PCB PR3500-02 which is mounted to the servo amplifier).

2 Remove the 4-pin connector from the power switch.

3 Remove the three mounting screws (3mm) from the rear and the two screws (4mm) at the bottom of the left and right side plates.

4 Remove the power supply section from the bottom rear.

2.3 Removing the Servo Amplifier

The servo amplifier is removed for repair and replacement, following the procedure below.

1 Remove the two mounting screws at the top and bottom.

2 Remove the servo amplifier from the rear.

2.4 Removing the Heat Controller

The heat controller consists of a single PCB which drives two GS3501 (for 40mm p-p recorders) or one GW3501 (for 80mm p-p recorders).

1 Remove the two screws holding the operating section to the mainframe top (3mm for the WR3500 and round posts for the WR3502), and then rotate the operating section upward.

2 Remove the two plastic rivets from the operating panel and remove the bottom half of this panel.

3 Remove the two heat control PCB mounting screws and pull out the PCB. Take care not to lose the protective frame which is attached to the switch on this PCB.

2.5 Removing the Chart Drive PCB

This PCB is removed for repair and replacement, following the procedure below.

1 Remove the two plastic rivets from the operating panel and remove the bottom half of this panel.

2 Remove the three screws holding the operating panel (heat control PCB side) and then remove the operating panel. When doing this, take care not to damage the print control switch which is mounted to the operating panel.

3 Remove the seven chart drive PCB mounting screws (four on the two heatsinks, two on the two groups of pushbutton switches and one at the right edge of the PCB) and then pull the PCB out from the front. When doing this, care is required, since the left edge of the PCB is held by the power switch mounting fixture.

2.6 Removing the Printing PCB

This PCB is removed for repair and replacement, following the procedure below.

1 Remove the two screws used to hold the print PCB mounting fixture.

2 Remove the printing PCB. This board is held on one side by the mounting fixture and the other side is fitted into a guide groove.

3. ADJUSTMENT

Each of these units is adjusted separately.

3.1 Pen Perpendicularity

Pen perpendicularity (i.e., the relationship between the chart paper scale and pen) is adjusted with either the power switched OFF or with the chart drive stopped. Adjustments around the pen are made with the operating panel in the upright attitude.

1 Adjust the three screws so that the pen motor side is parallel to the reference line on the chart paper.

2 Temporarily tighten the setscrew on the pen motor shaft.

3 Move the pen left and right by hand to check if it is perpendicular with the chart paper scale. If it is not, loosen the pen setscrew and adjust the pen mounting position.

4 Move the pen left and right by hand once again so that the movement of the pen is greater than the chart paper scale to verify that the approximate center of pen travel is at the scale line of the chart paper. If it is excessively offset, loosen the pen motor mounting screws and shift the motor left and right.

5 Verify that the pen tip forward and reverse positions coincide with the positions for the other pen. If they do not, loosen the pen motor mounting screws and shift the motor back and forth.

Note

Be sure that the pen is fully pressed in.

3.2 Servo Circuit Adjustment

The servo circuit adjustment trimmers are distributed in three locations and can be found on the servo amplifier PCB (three), stabilizer PCB (one), and heat control PCB (one).

These trimmers are adjusted by following the procedure below.

Stabilizer Voltage (STB +15)

The stabilizer voltage adjustment trimmer is located on the stabilizer PCB.

1 Measure the voltage between terminal TB2 (0V) on the stabilizer PCB and the +15 jumper. If it is not +15V ±0.2% (14.07 ∿ 15.03V), adjust it to within this range, using trimmer R6.

2 Measure the voltage between terminal TB2 and the -15V jumper and verify that the absolute value of this voltage is within ±0.2% (0.03V) of +15V jumper voltage.

Loop Gain (COMP)

The loop gain adjustment trimmer is located on the servo amplifier PCB.

1 Turn the individual channel heat switches OFF and use the position adjustment to move the pen to the approximate center of the chart paper scale.

2 Measure the voltage between terminals TB1 and TB2 and adjust this voltage to below ±0.2V, using trimmer R9.

Zero Point Position (ZERO)

The zero point adjustment trimmers are located on the heat control PCB.

1 Turn the position adjustments of each channel so that the pens are at the approximate center of the chart paper scale.

2 Short the following terminals using a clip.

Odd number channels: TB5 - TB6
Even number channels: TB10 - TB11

3 Adjust the following trimmers so that the pen is at the center of the chart paper scale.

Odd number channels: Trimmer R26
Even number channels: Trimmer R66

Note

With the position control turned fully and the check terminals shorted, the +15V or -15V is grounded and this condition should be avoided, since it can adversely affect the stabilizer circuitry.

Span

The span adjustment trimmer is located on the servo amplifier PCB.

1 Apply a +2.5V (±0.05%) input to the servo amplifier.

2 Set the heat switch of each channel to OFF and use the position adjustment to move the pens to the center of the recording paper scale.

3 Set the heat switch ON and adjust trimmer R4 so that the pen deflects 20mm to the left.

Freq

The frequency response adjustment trimmer is located on the servo amplifier PCB.

1 Input a 1Hz sinewave signal to the servo amplifier and adjust the amplitude of the signal to achieve a 10mm pen deflection.

2 With the signal frequency at 120Hz, adjust trimmer R15 so that the pen deflects 10mm.

3 Vary the signal frequency in the range 1Hz to 140Hz and verify that the pen deflection remains in the range 9mm ∿ 10.5mm.

If it varies beyond these limits, adjust trimmer R15 for the correct pen deflection with a 120Hz input.

3.3 Heat Control Circuit Adjustment

Adjustment of the heat control circuitry involves the use of a dummy resistance, since connecting a pen to an unadjusted heat control circuit can cause damage to the pen.

Heat control circuits for two channels are housed on a single PCB, with odd and even numbered channels separated. The description that follows uses the example of the odd channels, with even channel adjustment trimmers given in ( ).

Balance 1 (BAL 1)

Turn the overall heat switch to OFF and perform the following adjustment with the chart paper drive stopped.

1 Measure the voltage between TB1 (TB1) and TB2 (TB7) and adjust this voltage to 0V using trimmer R28 (R68).

Balance 2 (BAL 2)

1 Measure the voltage between TB1 (TB1) and TB3 (TB8) and adjust this voltage to 0V using trimmer R27 (R67).

Gain (COMP)

Feed the chart paper an appropriate speed and turn all individual heat switches ON.

1 Input a 1.25Hz triangle wave to the servo amplifier and adjust the signal amplitude for a 4mm pen deflection.

2 Measure the voltage between TB1 (TB1) and TB2 (TB7) and adjust this voltage to 0.25V using trimmer R29 (R69).

Bias (BIAS)

1 Short TB1 (TB1) and TB4 (TB9) using a clip.

2 Measure the voltage between TB1 (TB1) and the pen side lead of the dummy resistance and adjust this voltage value to 4.2 using the heat control knob.

3 Remove the short between TB1 (TB1) and TB4 (TB9) and stop the input signal. Set the overall heat switch to ON and set the chart feed to EXT.

4 Adjust trimmer R2 (R42) so that the voltage between TB1 (TB1) and the pen side lead of the dummy resistance is 3.8V.

3.4 Amp Unit Adjustment (AL3501, AH3501)

This section describes the adjustment of the DC voltage measurement amplifier units (AL3501/AH3501) using the AL3501 as an example. Items in ( ) apply to the AH3501.

Balance 1 (BAL 1)

Set the input switch to OFF and the Multiply switch to x100V (mV).

1 Adjust trimmer R12 so that the pen position does not change when the range is switched from 5V (2000) through 0.02 (5).

Balance 2 (BAL 2)

(This adjustment trimmer does not exist on the AL3501.)

1 Adjust trimmer R6 so that the pen position does not change when the Input switch is moved between the ON and OFF settings.

SPAN

There are two methods of performing the span adjustment.

o Span Adjustment A (Standard Method; Gain Knob Variable Range 40% ∿ 110%)

1 Set the R30 span adjustment trimmer to the center position.

2 Set the input sensitivity to 2V/FS and input 1V from a voltage generator. Verify that the pen deflection changes from less than 10div (8mm) to greater than 27div (22mm).

o Span Adjustment B (Gain Knob Variable Range 40% ∿ 110%)

1 Set the input sensitivity to 2V/FS and input 1V from a voltage generator.

2 Set the gain knob to the fully clockwise position and adjust trimmer R30 for a pen deflection of 25div (20mm).

3 Set the gain knob to the fully counter-clockwise position and verify that the pen deflection is less than 10div (8mm).

Calibration (CAL)

Calibration is adjusted after performing the span adjustment.

1 Set the Input switch to MEAS to record the pen deflections.

2 Set the Input switch to CAL and adjust trimmer R24 so that the pen deflection is the same as when the Input switch was set to MEAS.

3.5 Feed Control Circuit Adjustment

The feed control circuit adjustment must be performed with the feed motor (stepping motor) and marker pen connector removed. (If the feed motor is connected in the unadjusted condition, torque may develop on the motor in the stopped condition and abnormally high currents may cause a fuse to blow. If the marker pen is connected in this condition, the pen may even be damaged.)

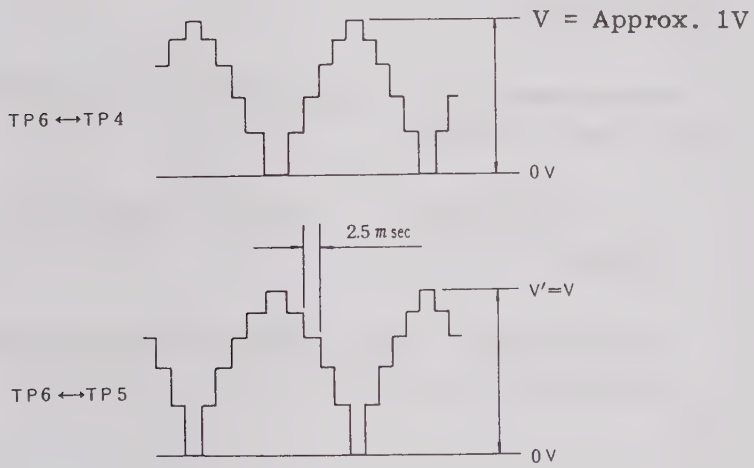
When making this adjustment, set all HEAT switches to OFF.

Torque Balance

Set the chart feed switch for a chart feed speed of 5mm/s.

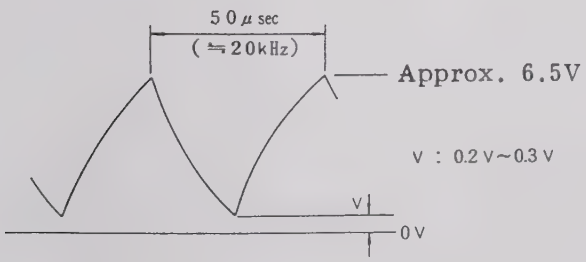
1 Measure the voltage between TP6 (ground) and TP4.

2 Adjust trimmer VR3 so that the voltage between TP6 (ground) and TP5 is the same as the voltage between TP6 and TP4.



Offset

1 Adjust trimmer VR4 so that the minimum level of the waveform between TP6 (ground) and TP8 is 0.2∿0.3V.



Feed signal

If this adjustment is not made properly, the recording density will be affected.

1 Set the feed to EXT.

2 Adjust trimmer VR1 so that the voltage between TP6 (ground) and TP2 is 0V.

Marker Density

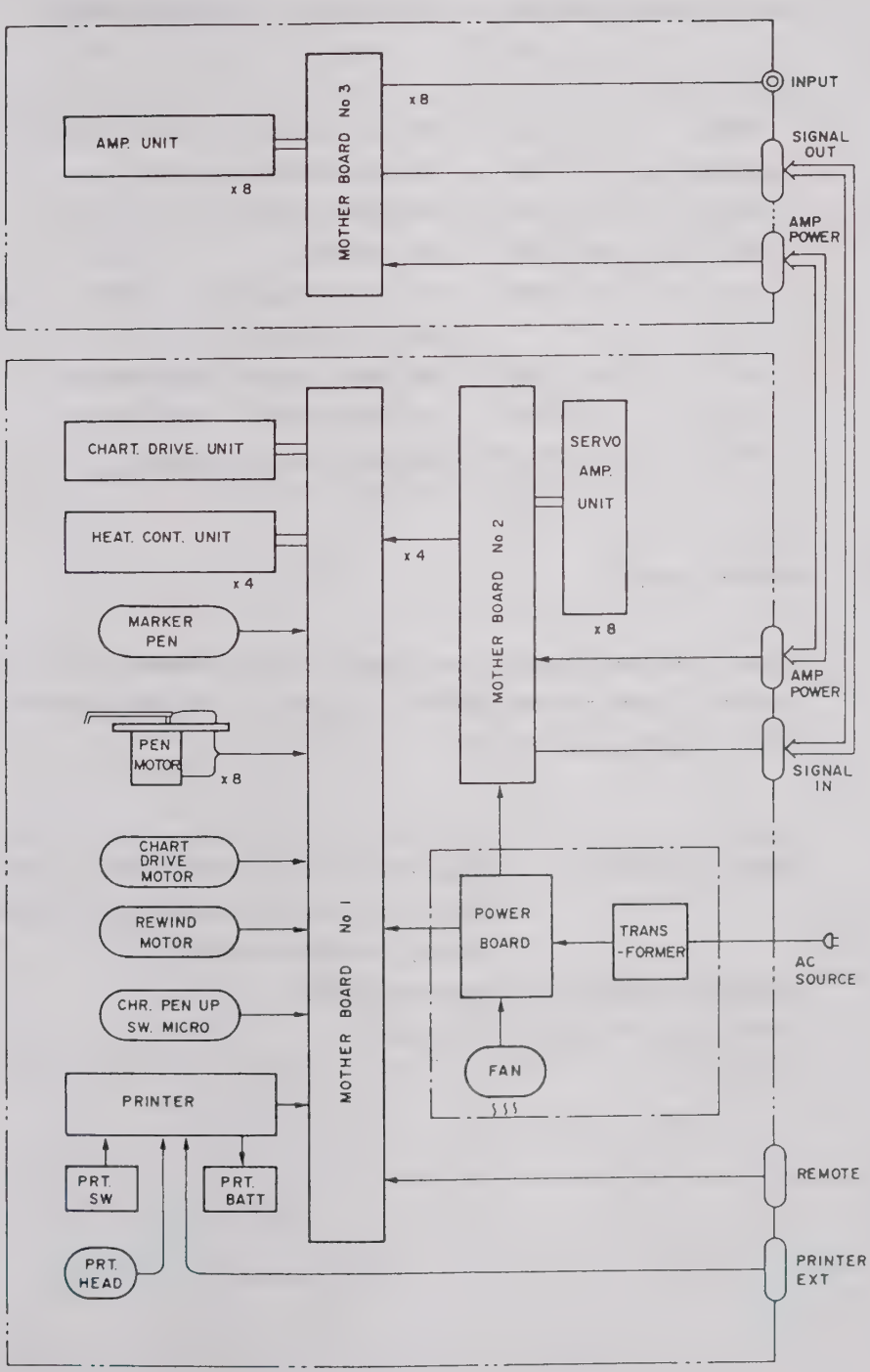
If this adjustment is not made properly, the marker recording density will be affected.

1 Set the switches to achieve a chart feed speed of 10mm/s.

2 Adjust trimmer VR2 so that the voltage between TP6 (ground) and TP7 is 8V.

4. BLOCK DIAGRAM DESCRIPTION

4.1 Block Diagram



4.2 Power Supply Section

The power supply section serves to supply power to the various other circuits and outputs the following voltages.

PVMOT	+16 ∿22V	For pen motor(s), feed, marker
MVMOT	-16 ∿22V	For pen motor(s), feed
+35V	+33 ∿39V	For feed motor
+24V (A)	+21 ∿25V	For printing
+24V (B)	+21 ∿25V	For heat control (Turn-on lags behind +24V(A))
+12V	+11 ∿13V	For servo amps, heat control
-12V	-11 ∿13V	For servo amps, heat control
+5V	+4.8∿5.2V	For feed, printing logic

4.3 Mother Boards

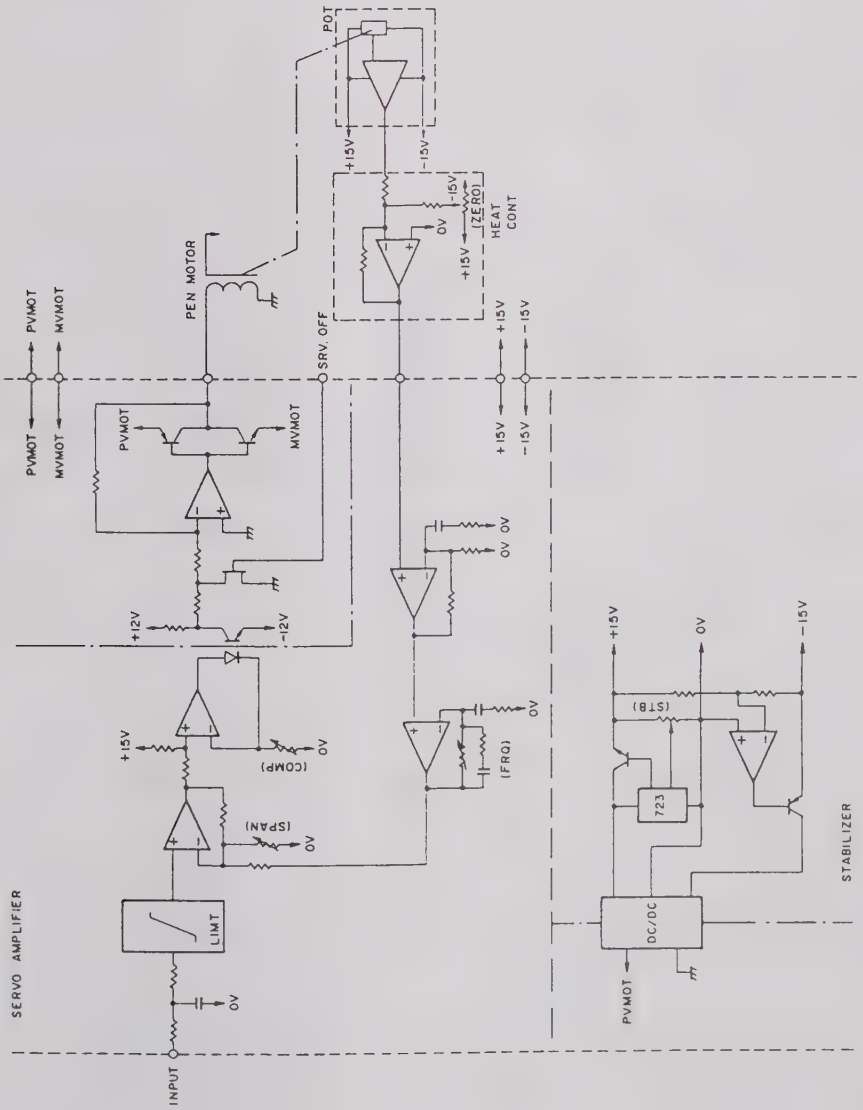
Three mother boards are used and separated for each section. Each mother board is connected to the sections as shown in the table below.

Mother board No. 1	Feed PCB, heat control PCB, printing PCB, pen motor, rewind motor, chart pen up detection switch.
Mother board No. 2	Servo amplifier
Mother board No. 3	Amp unit

4.4 Servo Amplifier/Pen Motor

The servo amplifier uses a dual power supply consisting of a ±15V (floating) supply and the PVMOT/MVMOT (grounded) power supply. Signal coupling is performed using photocouplers to provide isolation. The block diagram is shown below.

The pen motors use a new type of potentiometer, which differs from previous potentiometers with respect to supply voltage.

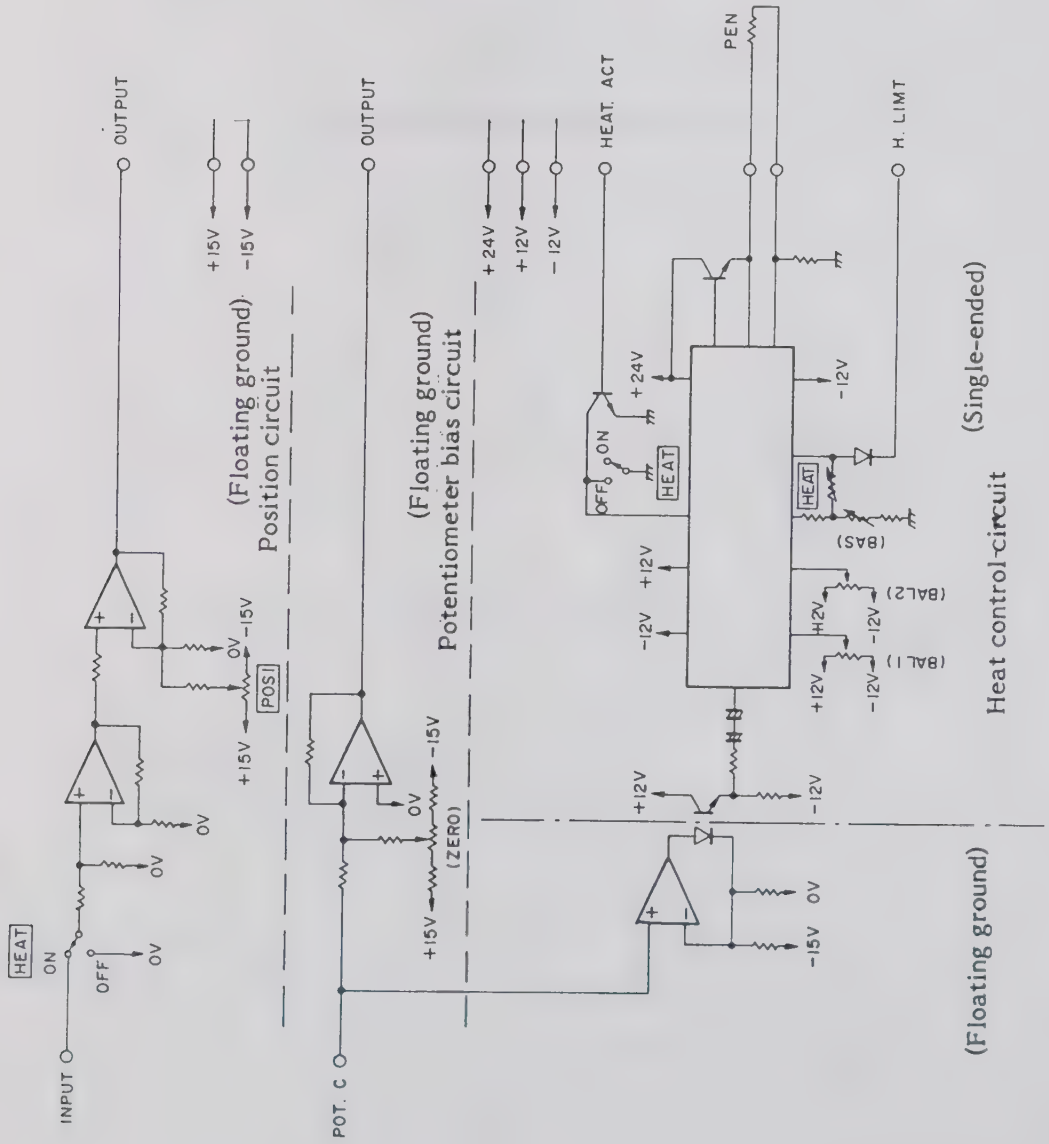


4.5 Heat Control

The heat control PCB contains the following circuits.

- o Heat control circuit
- o Position circuit
- o Potentiometer bias circuit

One PCB houses the above circuits for two channels.

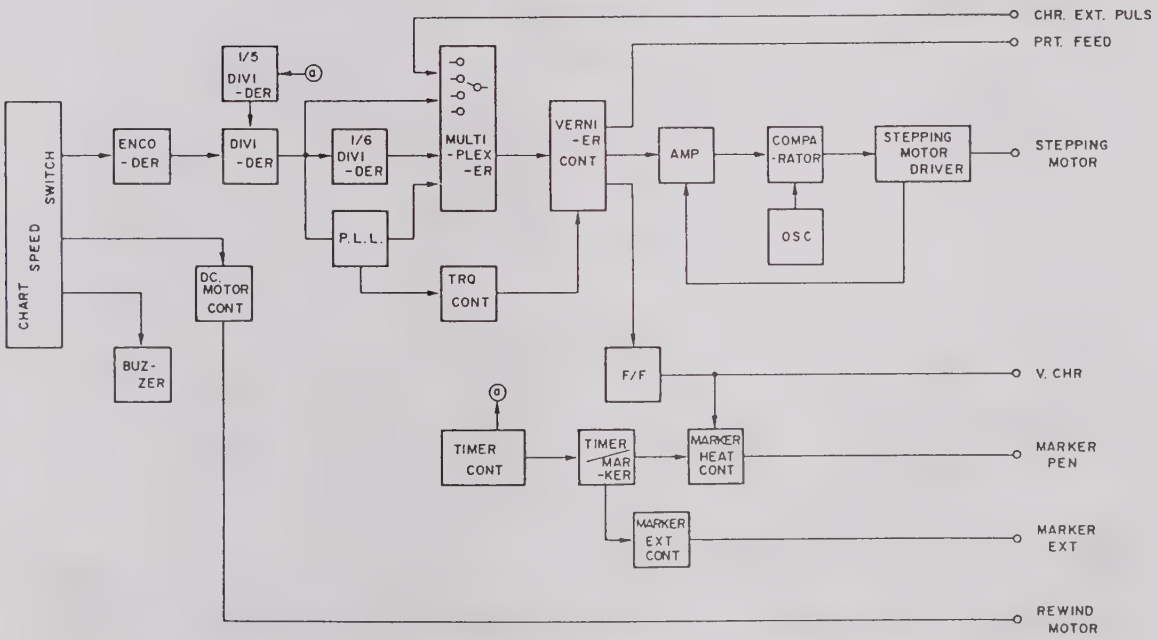


4.6 Feed Control

The feed control circuit performs control of the stepping motor used to feed the chart paper and the rewind motor. In addition, it performs marker pen control.

The feed speed is controlled by ROM (IC10).

Standard speed ROM:	MB7056-3
x1, x1/100 ROM:	MB7056-3(100)
1/5 speed ROM:	MB7056-3(5)

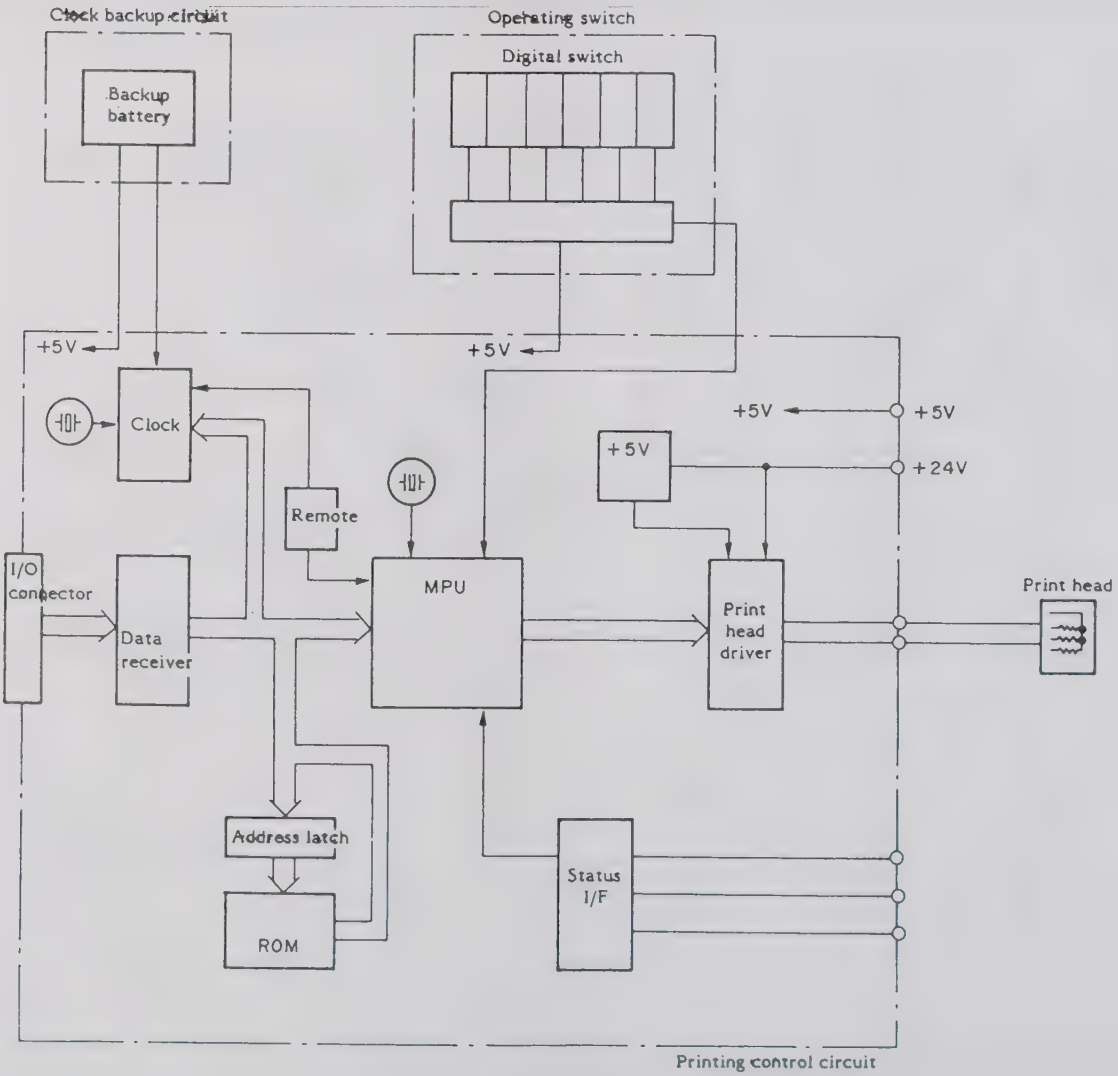


4.7 Printing Control

The printing control circuit consists of three PCBs.

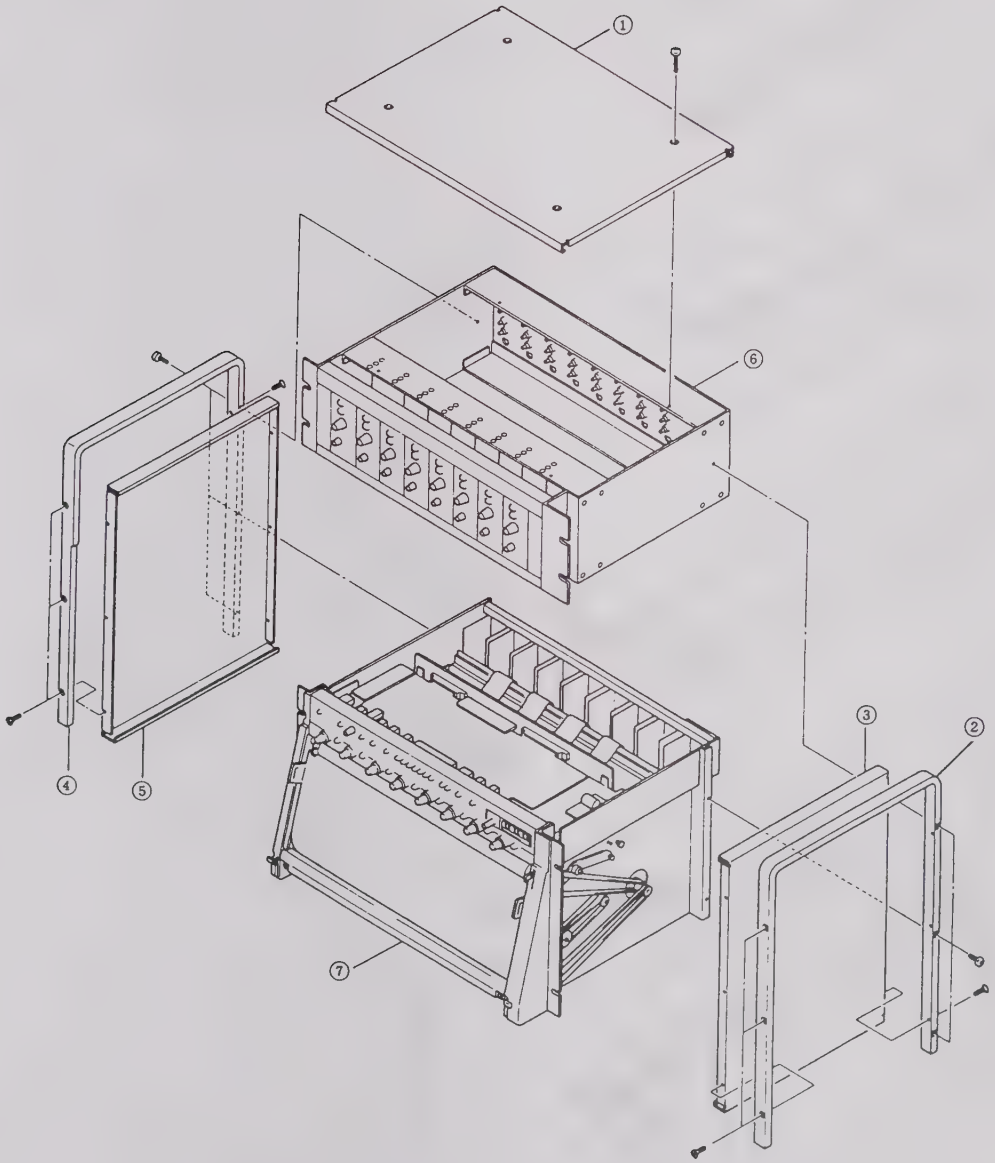
- o Control section (MPU) PCB
- o Operating switch section PCB
- o Backup battery PCB

The control section consists of a control MPU, clock and printing head driver. The clock power supply is provided by the backup battery. If this battery is not connected, the data printed will not be as expected.

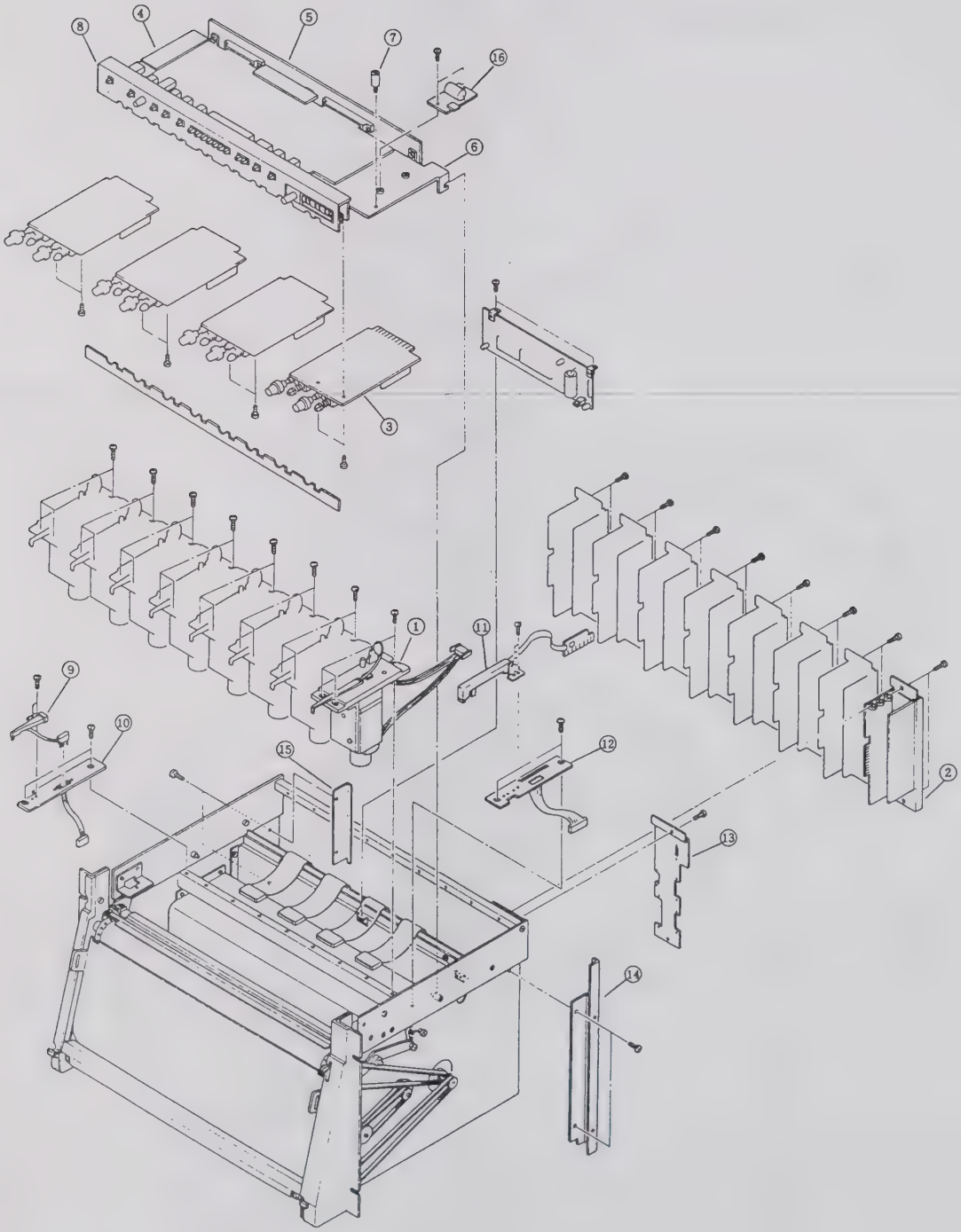


5. PARTS LISTS

5.1 Main Frame (1)



5.2 Main Frame (2)



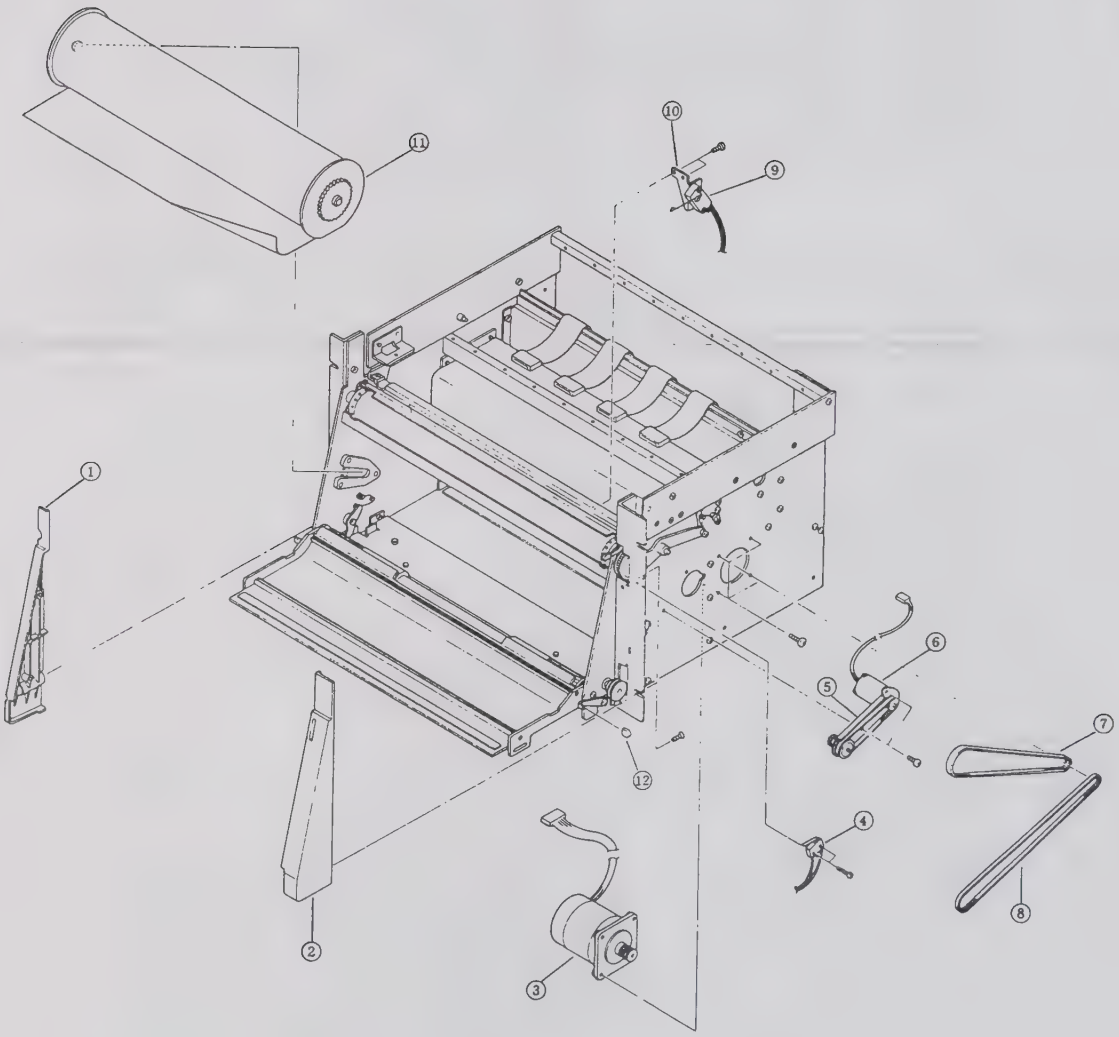
Main Frame(1)

Figure	Part No.	Description		Remarks
1	035005110	Upper Cover		
2	035005130	Frame, R		
3	035005150	Side Cover, R		
4	035005120	Frame, L		
5	035005140	Side Cover, L		
6	803503801	WA3503, Amplifier Box		
7	803502801	WR3502		

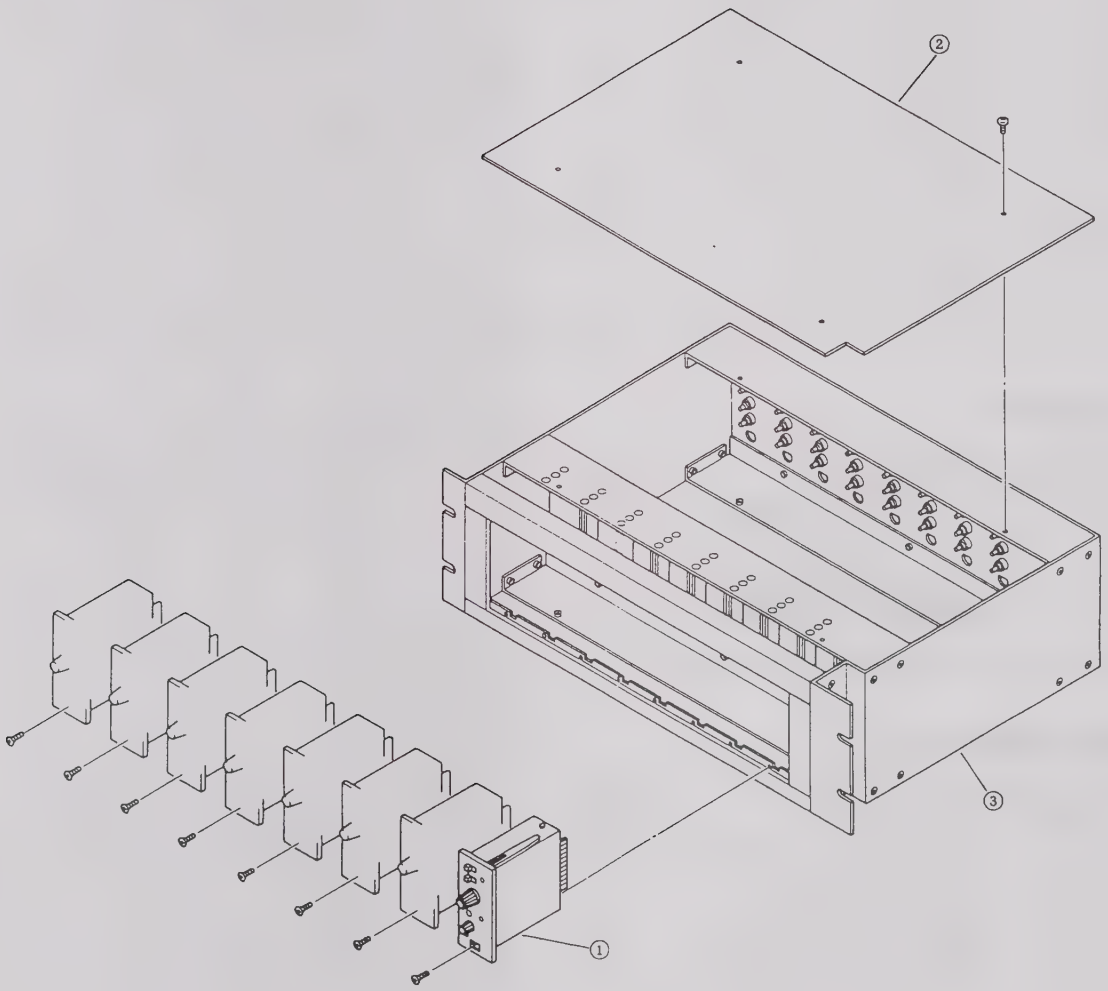
Main Frame(2)

Figure	Part No.	Description		Remarks
1	773500404	Pen Motor (40mm p-p)		For 40mm p-p
	773500415	Pen Motor (80mm p-p)		For 80mm p-p
2		Servo-Amp Unit		
3	773500402	Heat-Control Unit		
4	773500108	Chart-Drive Unit		
5	773500101	Mother-Board No. 1		
6	035000080	Plate, Drive PCB		
7	035005520	Support 3502		For WR3502
8	035005080	Control Panel A		
	035008800	Control Panel 100		For x1/x1/100
9	933101201	KT203		
10	035005030	Panel, Marker		
11	771310185	Print Head		
12	035005020	Panel, Print Head		
13	035005011	Rear Panel		
14	035005160	Rear Panel A		
15	035005170	Rear Panel B		
16	773500110	Backup Battery Unit		

5.3 Main Frame (3)



5 – 4 . Amp Box (4)



Main Frame (3)

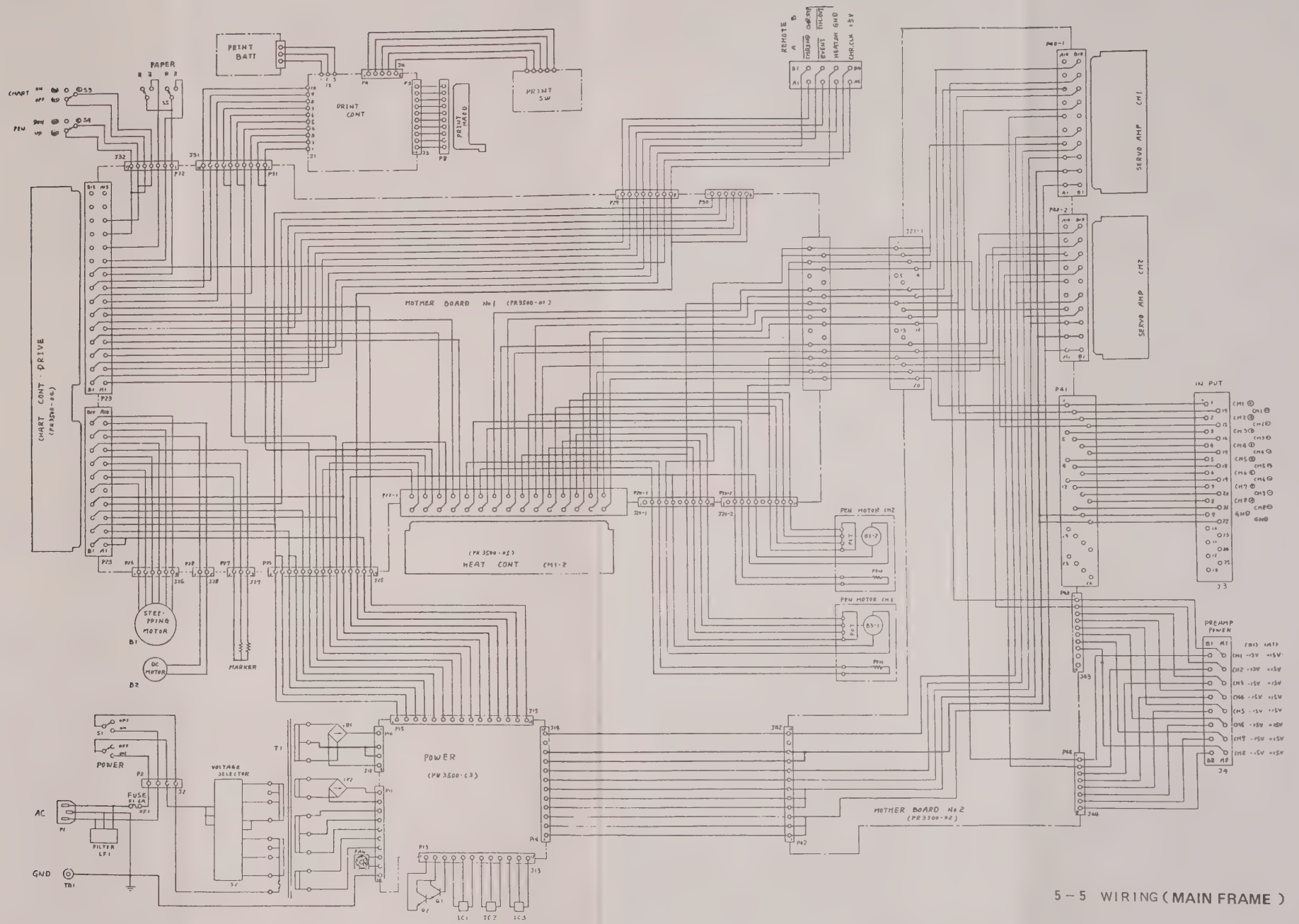
Figure	Part No.	Description		Remarks
1	735005040	Front Cover, L		
2	735005050	Front Cover, R		
3	509200022	Stepping Motor		
4	508401010	Micro Switch		
5	773500113	Rewind Unit		
6	509100017	DC Motor		
7	373500001	Belt 236M X L4.8		
8	376621052	Belt 236M X L3.2		
9	508401017	Micro Switch		
10	035002050	Holder, Micro Switch		
11	771310149	Stocker		
12	067113180	Cap		

Amp Box (4)

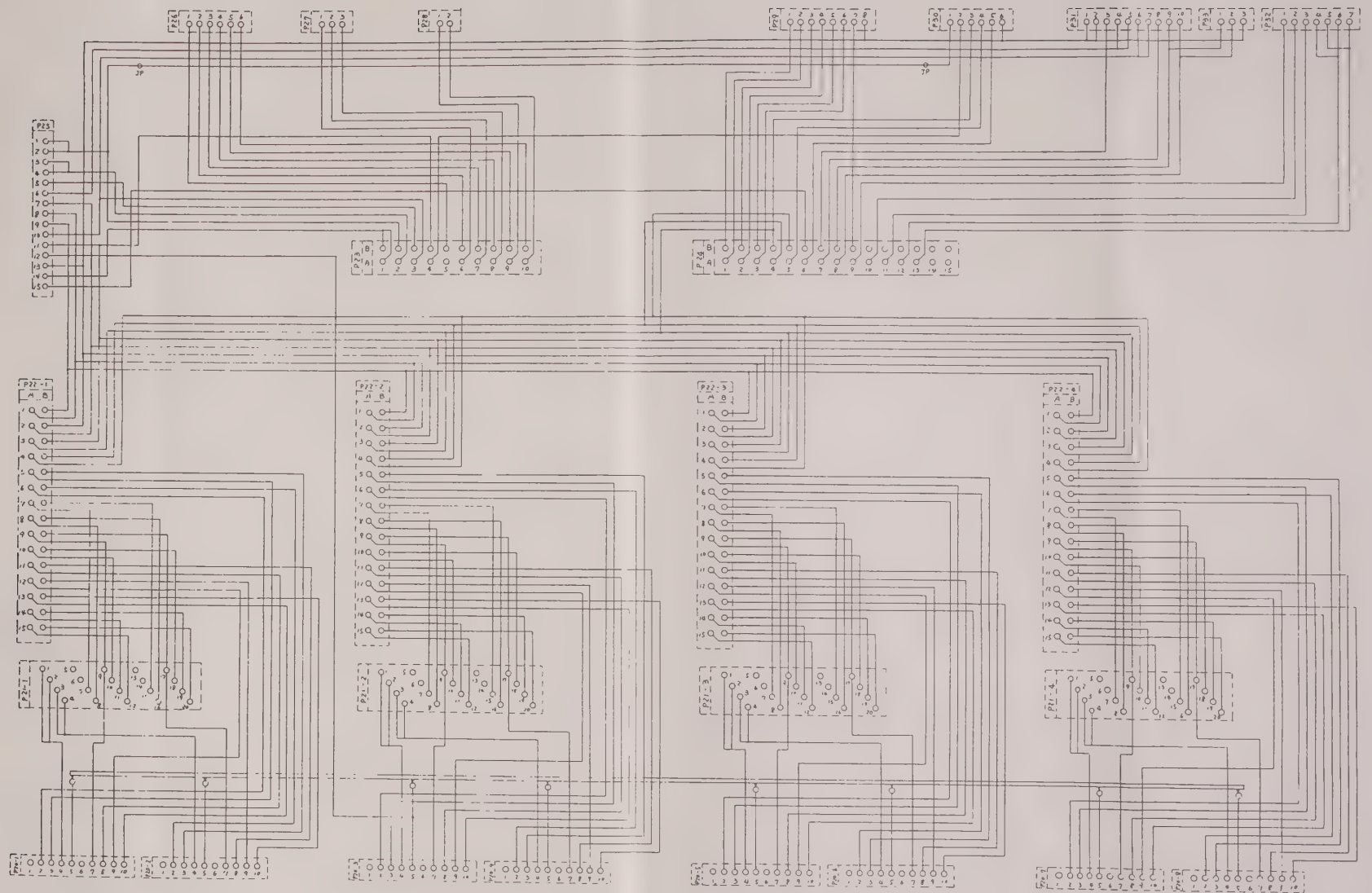
Figure	Part No.	Description		Remarks
1		Amplifier Unit		AL3501
		Amplifier Unit		AH3501
2	035005530	Upper Cover		For WA3503
3	803503801	Amplifier Box		

Wiring (Main Frame)

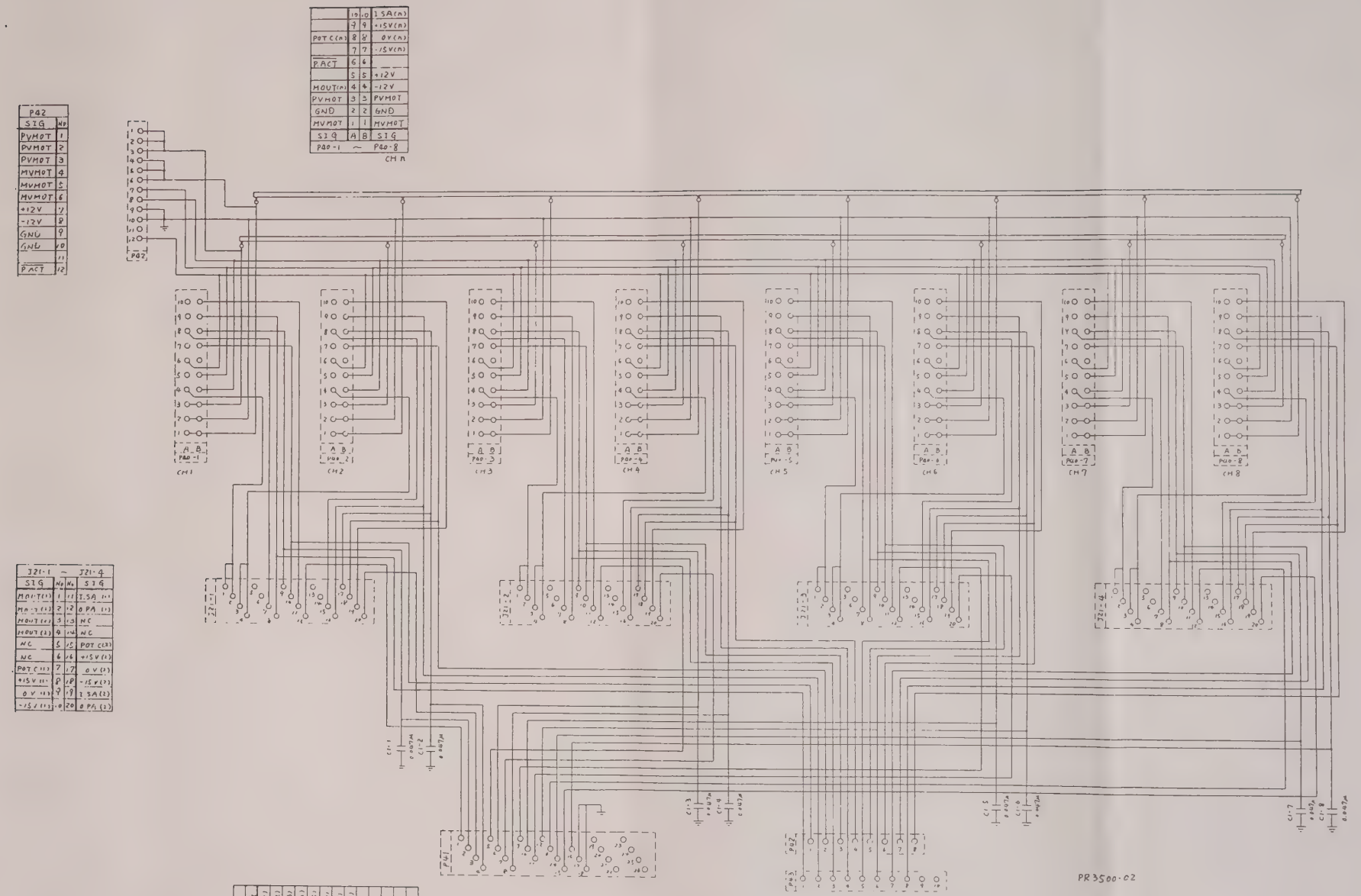
Figure	Part No.	Description	Type	Remarks
S1	508101010	Switch Push	1P0008AC1920	For AC
S3	508401017	Switch Micro	CC-5-L	
S4	508401010	"	SS-5GL	
S5	508302005	Switch Slide	SSB022L6RNS	For R/Z
B1	509200022	Stepping Motor	PH268-21-A8	
B2	509100017	DC Motor	LN30-N21N1	
B3		Pen Motor	GS3501, GW3501	
P2	513200403	Connector Plug 4P	CN625-4P-1	
P8	513300612	Connector 20P	225J21021-488	
J4	513400051	Connector Receptacle 16P	FCN361J016-AG	For AMP-POWER



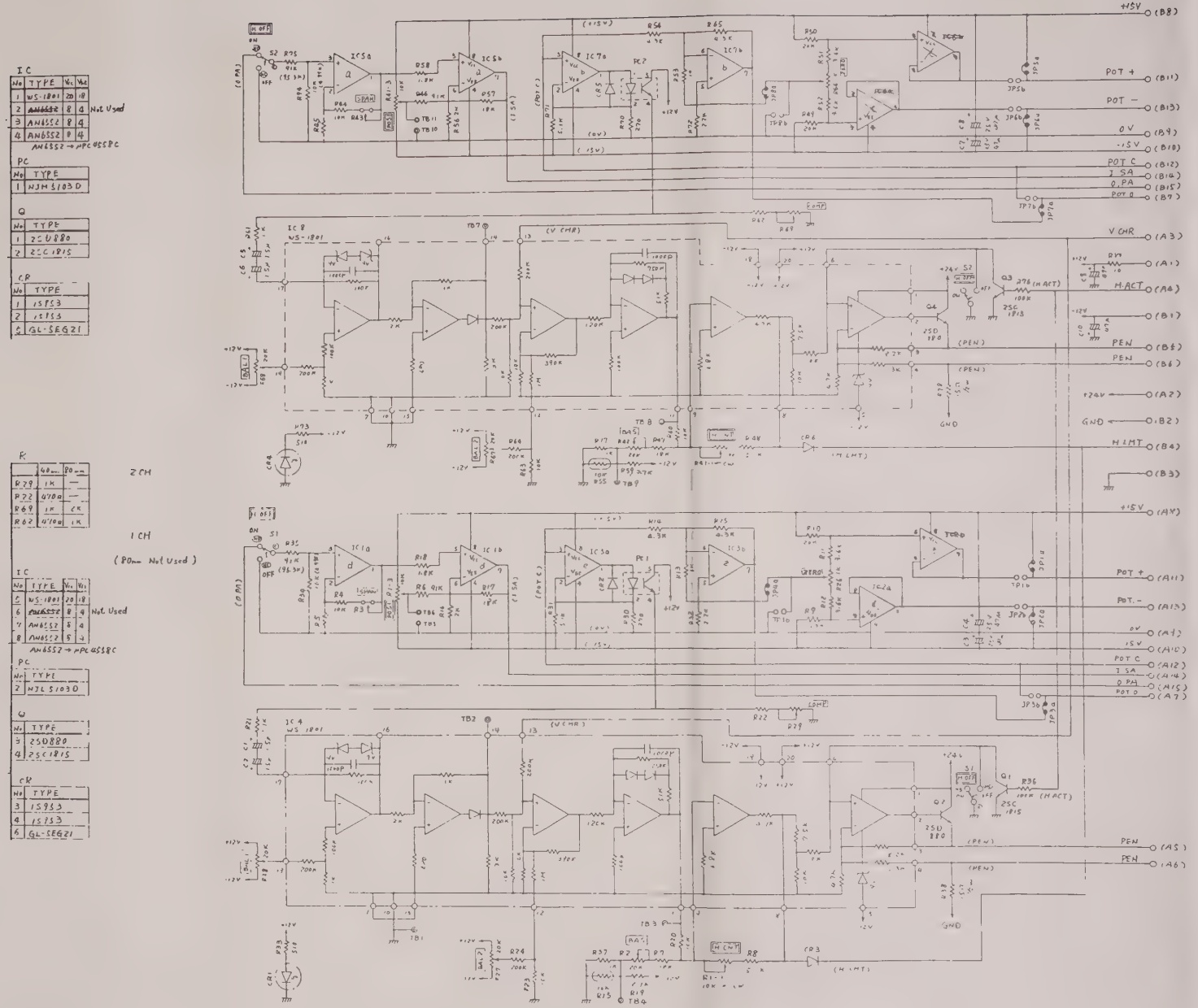
5－5 WIRING (MAIN FRAME)



5－6 MOTHER BOARD№1



5 – 7 MOTHER BOADNo 2



IC			
No	TYPE	V_{cc}	V_{EE}
1	WS-1801	20	18
2	~~AN6552~~	8	4
3	AN6552	8	4
4	AN6552	8	4

Not Used

AN6552 → μPC4558C

PC	
No	TYPE
1	NJM5103D

Q	
No	TYPE
1	2SD880
2	2SC1815

CR	
No	TYPE
1	1S953
2	1S953
3	GL-5EG21

R		40mm	80mm
	R29	1K	—
	R22	470Ω	—
	R69	1K	CR
	R62	470Ω	1K

2CH

1CH

(80mm Not Used)

IC			
No	TYPE	V_{cc}	V_{EE}
5	WS-1801	20	18
6	~~AN6552~~	8	4
7	AN6552	8	4
8	AN6552	8	4

Not Used

AN6552 → μPC4558C

PC	
No	TYPE
2	NJL5103D

Q	
No	TYPE
3	2SD880
4	2SC1815

CR	
No	TYPE
3	1S953
4	1S953
6	GL-5EG21

	R23 R63	R24 R60	R27 R67
5V/FS	98.0K	10K	1.0
1V/FS	10K	40K	"
500mV/FS	10K	91K	"
100mV/FS	8.7K	400K	"

JP1~8

Pot	
DOK	JP1b ~ JP8b Short
G	JP1a ~ JP8a Short

	R35·R75	R36·R76
WR3500 (5V/FS)	91K	10K
WR3532 (10V/FS)	95.3K	8.99K

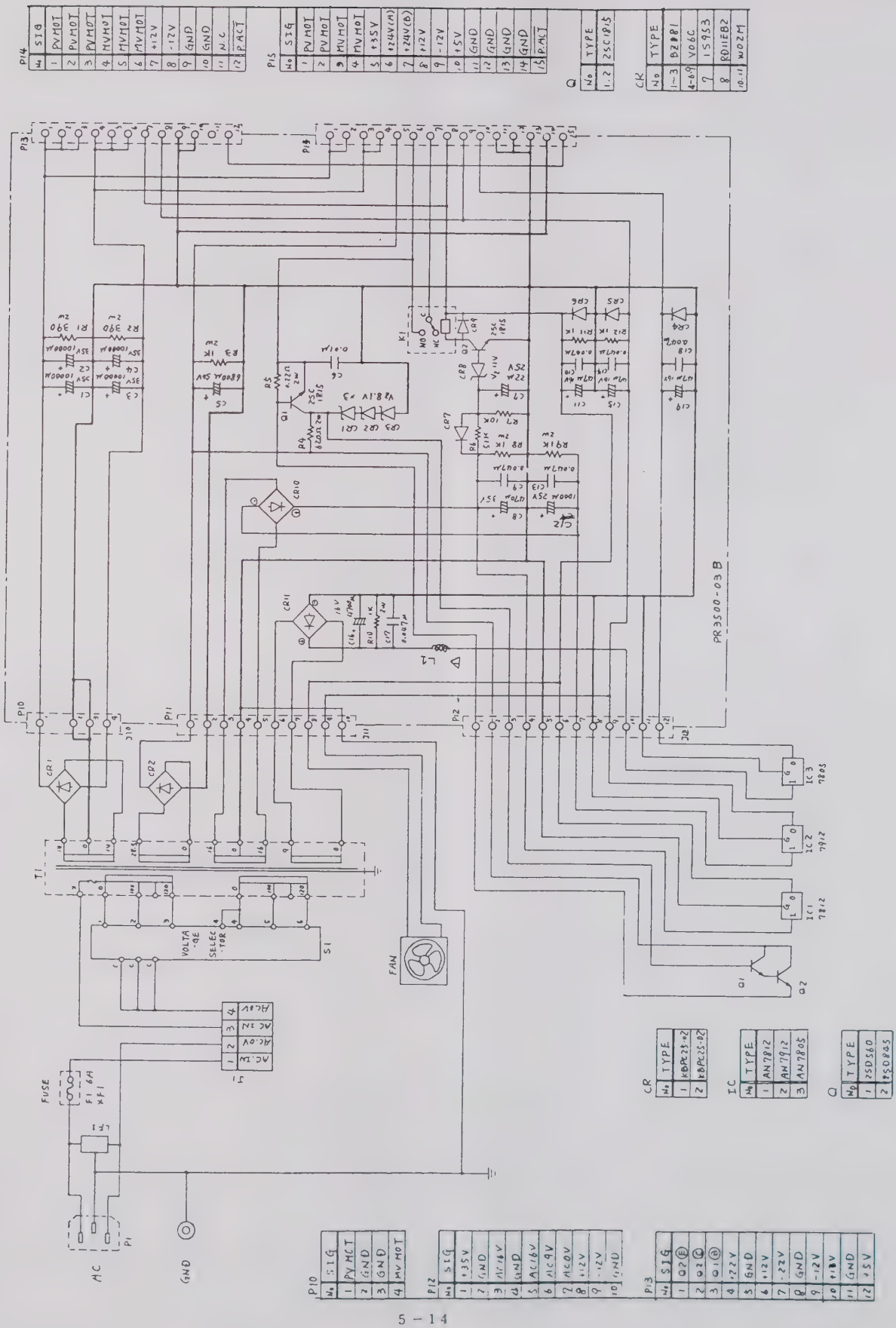
A		B
SIG	No	SIG
+12V	1	-12V
+24V (B)	2	GND
V. CHR	3	H LMT
M ACT	4	H LMT
PEN (B)	5	PEN (A)
PEN (B)	6	PEN (A)
POT O (B)	7	POT O (A)
+15V (B)	8	+15V (A)
-15V (B)	10	-15V (A)
POT + (B)	11	POT + (A)
POT - (B)	13	POT - (A)
POT - (B)	13	POT - (A)
I SA (B)	15	I SA (A)
O PA (B)	15	O PA (A)

Mother Board 1

Figure	Part No.	Description		Type	Remarks
P20-1 ~ P20-8	G513400075	Connector, Pin Header	10P	HNC2-25P-10DS	
P21-1 ~ P21-4		" "	20P	FCN704Q020AVM	
P22-1 ~ P22-4	A513300603	" "	15P	225J21521-487	
P23	A503300604	" "	10P	225J21021-487	
P24	A513300603	" "	15P	225J21521-487	
P25	G513400085	" "	15P	HNC2-2.5P-15DS	
P26	G513400062	" "	6P	HNC2-2.5P6DS	
P27	G513400039	" "	3P	HNC2-2.5P3DS	
P28	G513400038	" "	2P	HNC2-2.5P2DS	
P29	G513400079	" "	8P	HNC2-2.5P8DS	
P30	G513400062	" "	6P	HNC2-2.5P6DS	
P31	G513400075	" "	10P	HNC2-2.5P-10DS	
P32	G513400049	" "	7P	HNC2-2.5P7DS	
PCB		Printed Circuit Board		3500-01A	

Mother Board 2

Figure	Part No.	Description		Type	Remarks
J21-1 ~ J21-4		Connector, Receptacle		L180-20-1	
P40-1 ~ P40-8	A513300604	Connector, Pin Header	10P	225J21051-487	
P41		" "		L180-25-2	
P42	G513400078	" "	12P	HNC2-2.5P-12DS	
P43	G513400079	" "	8P	HNC2-2.5P-8DS	
P44	G513400075	" "	10P	HNC2-2.5P-10DS	
PCB		Printed Circuit Board		3500-02	

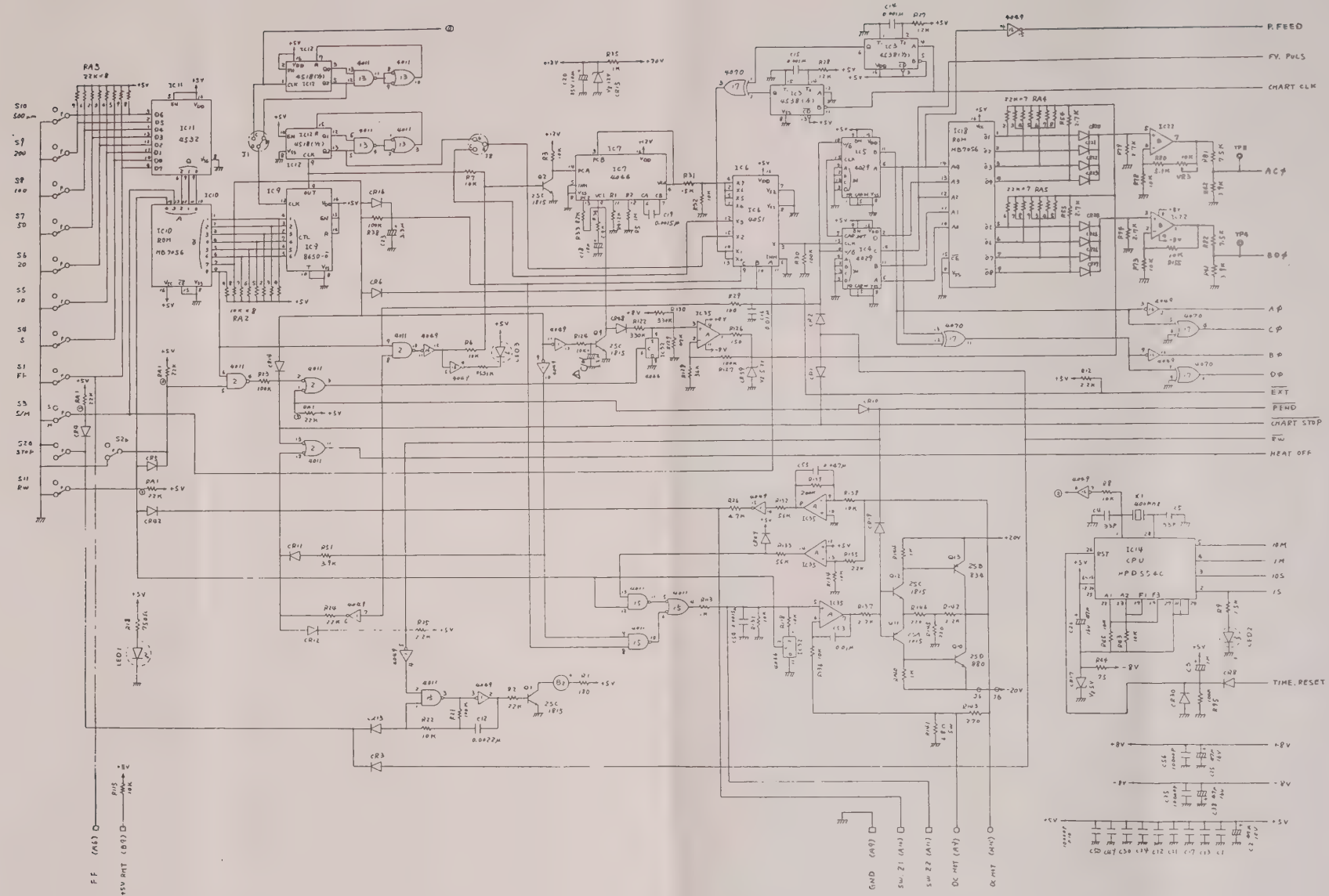

P14
P15
Q
CR
PR3500-03B
T1
S1
FAN
FUSE
F1 6A
AC
GND
P10
P12
P13
IC
IC1 7812
IC2 7912
IC3 7805
Q1
Q2

Power Box

Figure	Part No.	Description				Type	Remarks
IC1	A503303820	IC, Voltage Regulator	12V	1A		AN7812	
IC2	A503303819	" "	−12V	1A		AN7912	
IC3	A503301059	" "	5V	1A		AN7805	
Q1	G503200028	T, NPN	100V	5A	30W	2SD560	
Q2	G503203050	T, NPN	150V	12A	120W	2SD845	
CR1, 2	A503103013	Di, Bridge				KBPC25-02	
F1	B512300028	Fuse		6A		F102-SGA-6A	
LF1	A518110007					PZB4003-13	
FH1	G512400002	Fuse Holder				SN-2Q59	For FUSE
P1	A513500407	AC Socket				NC175	For AC
B4	A509200023	Fan				MD825-24	
For B4	A509200024	Speed Nut				MD825	
For B4	A509200025	Fan Guard				FG8B	
J1	513400161	Connector, Receptacle	4P			CN2390V-4	
J2	G513400072	" "	10P			HNC2-2.5S-10	
J3, 4	G513400065	" "	12P			HNC2-2.5S-12	
J5	G513400084	" "	15P			HNC2-2.5S-15	
J25	"	" "	15P			"	
J42	G513400065	" "	12P			HNC2-2.5S-12	
For J1	513400162	Contact Pin For 2390V TYPE				5167TL	
For J2 ~ 42	513400037	" For HNC2-2.5S TYPE				HNC-2.5S-A	
S1	B513501002	AC Selector Socket				9209 Socket	
For S1	B513501001	AC Selector Plug				9208 Plug	
T1	A510350010	Transformer				PT3500-01A	
TB1	G514400004	Terminal				SQ0204-02	For GND

Power PCB

Figure	Part No.	Description				Type	Remarks
Q1, 2	G503203014	T, NPN	30V 100mA	200mW		2SC1815, Y	
CR1 ~ 3	A503103031	Di, Zener	V_Z = 8.1V	1W		BZ081	
CR4 ~ 6	B503100021	" , Si	V_R = 200V	I_F = 4A		V06C	
CR7	G503100020	" , Si	V_R = 30V	I_F = 100mA		IS953	
CR8	A503100010	" , Zener	V_Z = 11V	0.5W		RD11EB2	
CR9	B503100021	" , Si	V_R = 200V	I_F = 4A		V06C	
CR10, 11	G503100022	" , Bridge	V_R = 200V	I_F = 1.5A		W02M	
R1, 2	G501606711	R, Metal Film	390Ω	2W	±5%	RSF2B-390J	
R3	G501606712	" "	1K	"	"	RSF2B01KJ	
R4	A501606720	" "	620Ω	"	"	RSF2B-620J	
R5	A501606726	" "	0.22Ω	"	"	RSF2B-0.22J	
R6	G501810410	" "	10K	1/4W	±1%	RN1/4-10KF	
R7	G501810451	" "	51K	"	"	RN1/4-51KF	
R8 ~ 10	G501606712	" "	1K	2W	±5%	RSF2B-1KJ	
R11, 12	G501204719	", Solid	1K	1/2W	"	RC1/2-1KJ	
C1 ~ 4	A502102018	C, Electrolytic	10000μ	35WV		ECET35R103SW	
C5	A502102021	" , "	6800μ	50WV		ECET50R682SW	
C6	G502403007	" , Ceramic	0.01μ	50WV		ULD06-103-L2A	
C7	A502103045	" , Electrolytic	22μ	25WV		ECEA1ES220	
C8	A502102016	" , "	470μ	35WV		ECEA1VS471	
C9, 10	G502303005	" , Myler Film	0.047μ	50WV		MFL-05S47	
C11	A502102029	" , Electrolytic	47μ	16WV		ECEA1CS470	
C12	A502103052	" , "	1000μ	25WV		ECEA1ES102	
C13, 14	G502303005	" , Myler Film	0.47μ	50WV		MFL-05S47	
C15	A502102029	" , Electrolytic	47μ	16WV		ECEA1CS470	
C16	A502102017	" , "	4700μ	16WV		ECEA1CS472	
C17, 18	G502303005	" , Myler Film	0.047μ	50WV		MFL-05S47	
C19	A502102029	" , Electrolytic	47μ	16WV		ECEA1CS470	
K1	A515110019	Relay DC 12V				HB1-DC12	
P1	A513400163	Connector, Pin Header	4P			5289-04A	
P2	G513400075	" "	10P			HNC2-2.5P-10DS	
P3, 4	G513400078	" "	12P			HNC2-2.5P-12DS	
P5	G513400085	" "	15P			HNC2-2.5P-15DS	
L1	G518110008	Coil				SN-8S-500	
PCB	A511350030	Printed Circuit Board				3500-03B	



IC No	TYPE	Vdd	Vss
1	TC4049BP	1	8
2	TC4011BP	14	7
3	MDH5380	16	8
4	TC4027BP	16	8
5	TC4027BP	16	8
6	TC4051BP	16	8
7	MDH0046	16	8
8	Not Used	—	—
9	8650-0	16	8
10	MB7056-3	16	8
11	TC4532BP	16	8
12	TC4518BP	16	8
13	TC4011BP	14	7
14	μPC554C		
15	TC8211BP	16	7
16	TC4049BP	1	8
17	MDH0070B	14	7
18	MB7056-2	16	8
19	MB4206	1	14
20	AN6552	8	4
21	AN6554	4	11
22	AN6552	8	4
23	AN6552	8	4
24	μPC339C	3	12
25	AN78L08		
26	μPC1555C	8	1
27	μPC157C	7	4
28	MDH5380	16	8
29	TC4001BP	14	7
30	TC4049BP	1	8
31	TC4001BP	14	7
32	TC4066BP	14	7
33	M74LS04	14	7
34	μPA13C	-	17
35	AN6554	4	11

5 – 9 CHART DRIVER UNIT (1/2)

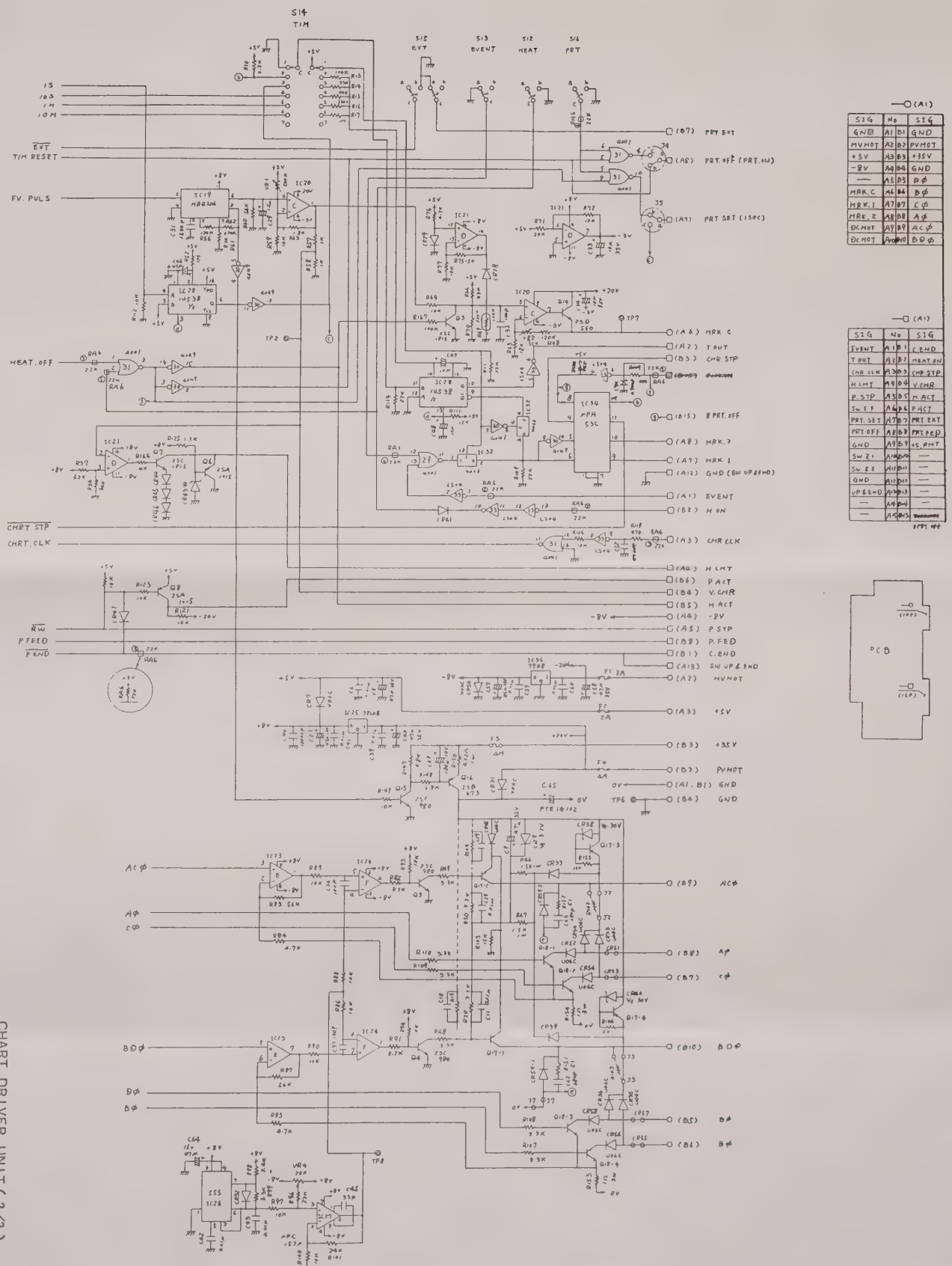


CHART DRIVER UNIT (2/2)

Chart Driver Unit

Figure	Part No.	Description	Type	Remarks
IC1	G503300094	IC, CMOS Hex Inverting Buffer	TC4049BP	
IC2	G503300062	" , CMOS Quad 2 In-Nand	TC4011BP	
IC3	A503301035	" , CMOS Dual Monostable Multivibrator	HD14538B	
IC4, 5	G503300107	" , CMOS Binary U/D Counter	TC4029BP	
IC6	G503300113	" , CMOS 8-ch, Multiplexer	TC4051BP	
IC7	A503302049	" , CMOS Phase-Locked Loop	HD14046B	
IC9	A503300100	" , CMOS Programable Dividen	8650-O	
IC10	A503303821	" , NMOS Bipolar Memory	MB7056-3	
IC11	A503300118	" , CMOS Encorder	TC4532BP	
IC12	A503301015	" , CMOS DUAL BCD UP COUNTER	TC4518BP	
IC13	G503300062	" , CMOS Quad 2 In-Nand	TC4011BP	
IC14	G503300049	" , PMOS Micro Computer	μPD554C-015	
IC15	G503300062	" , CMOS Quad 2 In-Nand	TC4011BP	
IC16	G503300094	" , CMOS Hex Inverting Buffer	TC4049BP	
IC17	A503302050	" , CMOS Quadruple Exclusive-OR Gate	HD14070B	
IC18	A503302052	" , NMOS Bipolar Memory	MB7056-2	
IC19	A503300122	" , F/V	MB4206	
IC20	A503301057	" , Op-Amp Dual	AN6552	
IC21	A503301058	" , Op-Amp Quadruple	AN6554	
IC22	A503301057	" , Op-Amp Dual	AN6552	
IC23	"	" , "	"	
IC24	A503300121	" , Comparator	μPC339C	
IC25	A503303822	" , Voltage Regulator 8V 0.25A	AN78L08	
IC26	A503303473	" , Timer	μPC1555C	
IC27	A503300123	" , Op-Amp	μPC157C	
IC28	A503301035	" , Dual Precision Monostable Multivibrator	HD14638B	
IC29	A503303215	" , CMOS Quad 2-Input NOR	TC4001BP	
IC30	G503300094	" , CMOS Hex Inverting Buffer	TC4049BP	
IC31	A503303215	" , CMOS Quad 2-Input NOR	TC4001BP	
IC32	G503300052	" , CMOS Dual Bilateral Switch	TC4066BP	
IC33	A503303471	" , TTL Hex Inverting Buffer	M74LS04P	
IC34	A503300053	" , Darlington Transistor Array	μPA53C	
IC35	A503301058	" , Op-Amp Quadruple	AN6554	
IC36	A503303823	" , Voltage Regulator −8V 1A	AN7098	
Q1 ~ 3	G503203014	Tr, NPN 30V 100mA 200mW	2SC1815	
Q4, 5	A503203017	" , NPN 70V 100mA 400mW	2SC980	
Q6	G503203016	" , PNP −30V −100mA 200mW	2SA1015	
Q7	G503203014	" , NPN 30V 100mA 200mW	2SC1815	
Q8	G503203016	" , PNP −30V −100mA 200mW	2SA1015	
Q9	G503203014	" , NPN 30V 100mA 200mW	2SC1815	
Q10	A503203047	" , NPN 60V 3A 30W	2SD880	
Q11	G503203016	" , PNP −30V −100mA 200mW	2SA1015	
Q12	G503203014	" , NPN 30V 100mA 200mW	2SC1815	
Q13	G503203048	" , PNP −60V −3A 30W	2SB834	

Figure	Part No.	Description	Type	Remarks
Q14	G503200028	Tr, NPN Darlington 60V 5A 30W	2SD560	
Q15	A503203017	" , NPN 70V 100mA 400mW	2SC980	
Q16	G503203026	" , PNP Darlington −100V −7A 40W	2SB673	
Q17	A503203063	" , Array PNP Darlington x 4	FT5761M	
Q18	A503203065	" , Array NPN " x 4	FT5758M	
CR1 ~ 6	G503100020	Di, Si V_R = 30V I_F = 100mA	IS953	
CR7	B503100021	" , " V_R = 200V I_F = 4A	V06C	
CR8	G503100020	" , " V_R = 30V I_F = 100mA	IS953	
CR9	G503100052	" , Zener V_Z = 3.2V 0.5W ±5%	RD3.3EB2	
CR10 ~ 14	G503100020	" , Si V_R = 30V I_F = 100mA	IS953	
CR15	G503100006	" , Zener 12V 0.5W ±5%	RD12EB3	
CR16	G503100020	" , Si V_R = 30V I_F = 100mA	IS953	
CR17	G503100060	" , Zener 5.2V 0.5W ±5%	RD5.1EB3	
CR18	B503103004	" , Fast Recovery V_R = 200V I_F = 2A	U06C	
CR19 ~ 30	G503100020	" , Si V_R = 30V I_F = 100mA	IS953	
CR31	B503100021	" , " V_R = 200V I_F = 4A	V06C	
CR32	G503100020	" , " V_R = 30V I_F = 100mA	IS953	
CR33 ~ 36	B503103004	" , Fast Recovery V_R = 200V I_F = 2A	U06C	
CR37	G503100020	" , Si V_R = 30V I_F = 100mA	IS953	
CR38	G503100037	" , Zener V_Z = 30V 1W ±5%	RD30FB3	
CR39	G503100020	" , Si V_R = 30V I_F = 100mA	IS953	
CR40	G503100037	" , Zener V_Z = 30V 1W ±5%	RD30FB3	
CR41, 42	G503100020	" , Si V_R = 30V I_F = 100mA	IS953	
CR43	G503100052	" , Zener 3.2V 0.5W ±5%	RD3.3EB2	
CR44 ~ 49	G503100020	" , Si V_R = 30V I_F = 100mA	IS953	
CR50	G503100021	" , " V_R = 200V I_F = 4A	V06C	
CR52	B503103004	" , Fast Recovery V_R = 200V I_F = 2A	U06C	
CR54	"	" , " " "	"	
CR56	"	" , " " "	"	
CR58	"	" , " " "	"	
CR59	A503100066	" , Si Diode Module	5EH2M NEC	
LED1	B512100018	Di, LED	SLB26UB	
LED2, 3	B512100017	" , LED	TLR102A	
R1	G501810218	R, Metal Film 180Ω 1/4W ±1%	RN1/4-180F	
R2	G501810422	" , " 22K " "	RN1/4-22KF	
R3	G501810410	" , " 10K " "	RN1/4-10KF	
R4	G501810412	" , " 12K " "	RN1/4-12KF	
R5	G501810610	" , " 1M " "	RN1/4-1MF	
R6 ~ 8	G501810410	" , " 10K " "	RN1/4-10KF	
R9	G401810315	" , " 1.5K " "	RN1/4-1.5KF	
R10	G501810322	" , " 2.2K " "	RN1/4-2.2KF	
R11	G501810422	" , " 22K " "	RN1/4-22KF	

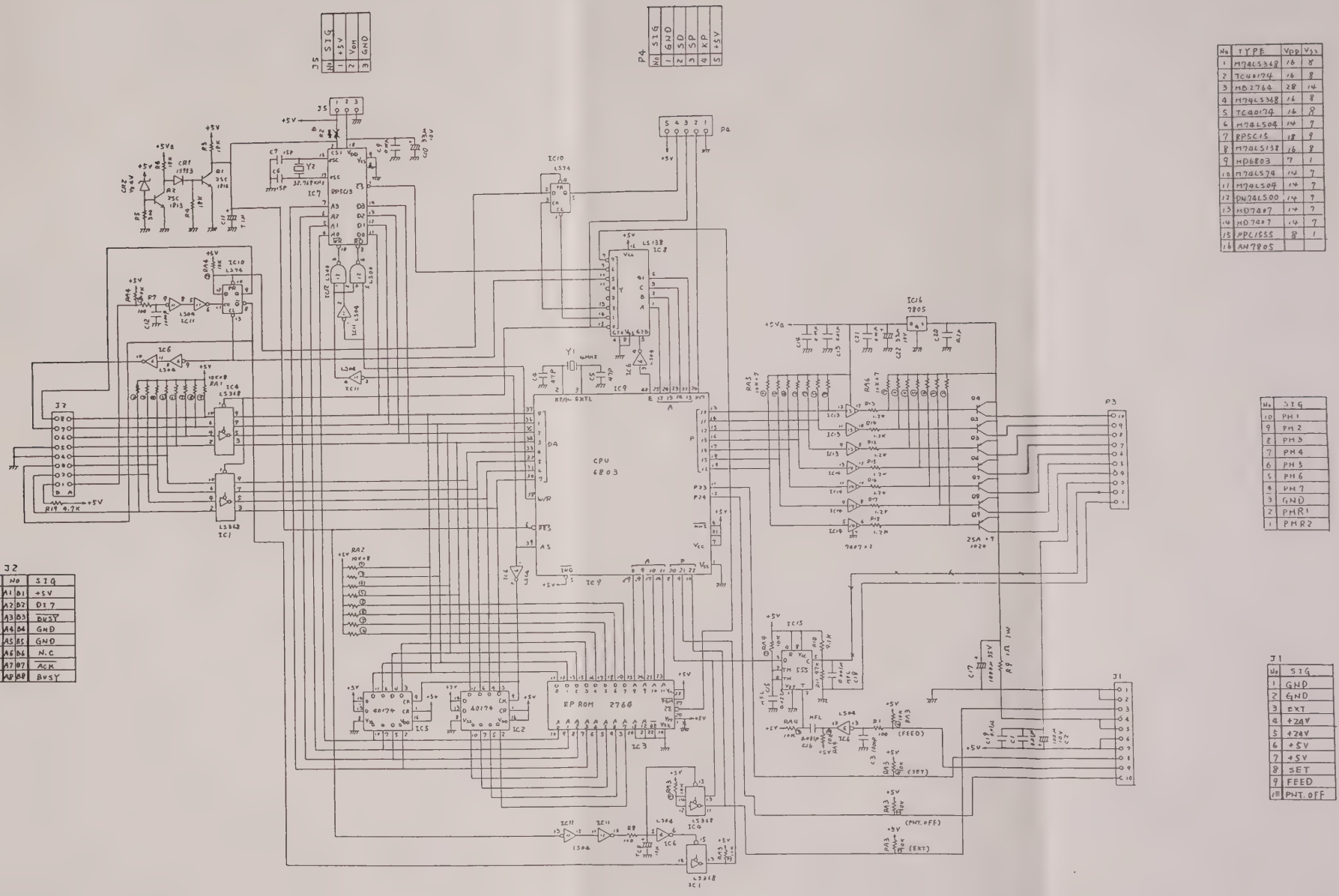
Figure	Part No.	Description				Type	Remarks
R12	G501810322	R, Metal Film	2.2K	1/4W	±1%	RN1/4-2.2KF	
R13	G501810510	", "	100K	"	"	RN1/4-100KF	
R14	G501810433	", "	33K	"	"	RN1/4-33KF	
R15	G501810510	", "	100K	"	"	RN1/4-100KF	
R16	G501810556	", "	560K	"	"	RN1/4-560KF	
R17	G501810610	", "	1M	"	"	RN1/4-1MF	
R18	G501810275	", "	750Ω	"	"	RN1/4-750F	
R20	G501810322	", "	2.2K	"	"	RN1/4-2.2KF	
R21	G501810510	", "	100K	"	"	RN1/4-100KF	
R22	G501810410	", "	10K	"	"	RN1/4-10KF	
R23	G501810510	", "	100K	"	"	RN1/4-100KF	
R24	G501810422	", "	22K	"	"	RN1/4-22KF	
R25	G501810322	", "	2.2K	"	"	RN1/4-2.2KF	
R26	G501810347	", "	4.7K	"	"	RN1/4-4.7KF	
R27, 28	G501810412	", "	12K	"	"	RN1/4-12KF	
R29	G501810210	", "	100Ω	"	"	RN1/4-100F	
R30	G501810510	", "	100K	"	"	RN1/4-100KF	
R31	G501810415	", "	15K	"	"	RN1/4-15KF	
R32	G501810410	", "	10K	"	"	RN1/4-10KF	
R33	G501810482	", "	82K	"	"	RN1/4-82KF	
R34	G501810324	", "	2.4K	"	"	RN1/4-2.4KF	
R35	G501810310	", "	1K	"	"	RN1/4-1KF	
R36	G501810236	", "	360Ω	"	"	RN1/4-360F	
R37	G501810462	", "	62K	"	"	RN1/4-62KF	
R38	G501810510	", "	100K	"	"	RN1/4-100KF	
R41, 42	G501810339	", "	3.9KF	"	"	RN1/4-3.9KF	
R43	G501810410	", "	10K	"	"	RN1/4-10KF	
R44	G501810175	", "	75Ω	"	"	RN1/4-75F	
R45	G501810410	", "	10K	"	"	RN1/4-10KF	
R46, 47	A501605738	", "	1.5K	1W	±5%	RSF1B-1.5KJ	
R48, 49	G501810333	", "	3.3K	1/4W	±1%	RN1/4-3.3KF	
R50	G501810322	", "	2.2K	"	"	RN1/4-2.2KF	
R51	G501810339	", "	3.9K	"	"	RN1/4-3.9KF	
R52	G501810610	", "	1M	"	"	RN1/4-1MF	
R53	G501810310	", "	1K	"	"	RN1/4-1KF	
R54, 55	G501810327	", "	2.7K	"	"	RN1/4-2.7KF	
R56	G501810512	", "	120K	"	"	RN1/4-120KF	
R57, 58	G501810310	", "	1K	"	"	RN1/4-1KF	
R59	G501810410	", "	10K	"	"	RN1/4-10KF	
R60	G501810456	", "	56K	"	"	RN1/4-56KF	
R61	G501810382	", "	8.2K	"	"	RN1/4-8.2KF	
R62	G501810562	", "	620K	"	"	RN1/4-620KF	
R63	G501810318	", "	1.8K	"	"	RN1/4-1.8KF	
R64	G501810410	", "	10K	"	"	RN1/4-10KF	
R65	G501810418	", "	18K	"	"	RN1/4-18KF	

Figure	Part No.	Description				Type	Remarks
R66	G501810443	R, Metal Film	43K	1/4W	±1%	RN1/4-43KF	
R67	G501810510	", "	100K	"	"	RN1/4-100KF	
R68	G501810512	", "	120K	"	"	RN1/4-120KF	
R69	G503103012	Thermister B-Class	100K			100KD-7	
R70	G501810520	R, Metal Film	200K	1/4W	±1%	RN1/4-200KF	
R71	G501810420	", "	20K	"	"	RN1/4-20KF	
R72	G501810412	", "	12K	"	"	RN1/4-12KF	
R73	G501810410	", "	10K	"	"	RN1/4-10KF	
R74	G501810327	", "	2.7K	"	"	RN1/4-2.7KF	
R75	G501810415	", "	15K	"	"	RN1/4-15KF	
R76	G501810347	", "	4.7K	"	"	RN1/4-4.7KF	
R77, 78	G501810410	", "	10K	"	"	RN1/4-10KF	
R79	G501810327	", "	2.7K	"	"	RN1/4-2.7KF	
R80	G501810351	", "	5.1K	"	"	RN1/4-5.1KF	
R81, 82	G501810375	", "	7.5K	"	"	RN1/4-7.5KF	
R83	G501810456	", "	56K	"	"	RN1/4-56KF	
R84, 85	G501810347	", "	4.7K	"	"	RN1/4-4.7KF	
R86	G501810410	", "	10K	"	"	RN1/4-10KF	
R87	G501810456	", "	56K	"	"	RN1/4-56KF	
R88, 89	G501810410	", "	10K	"	"	RN1/4-10KF	
R90	"	", "	"	"	"	"	
R91, 92	G501810382	", "	8.2K	"	"	RN1/4-8.2KF	
R93, 94	G501810410	", "	10K	"	"	RN1/4-10KF	
R95	G501810510	", "	100K	"	"	RN1/4-100KF	
R97	G501810410	", "	10K	"	"	RN1/4-10KF	
R98	G501810324	", "	2.4K	"	"	RN1/4-2.4KF	
R99	G501810333	", "	3.3K	"	"	RN1/4-3.3KF	
R100	G501810410	", "	10K	"	"	RN1/4-10KF	
R101	G501810424	", "	24K	"	"	RN1/4-22KF	
R105	G501810415	", "	15K	"	"	RN1/4-15KF	
R106	G501810210	", "	100Ω	"	"	RN1/4-100F	
R107 ~ 109	G501810333	", "	3.3K	"	"	RN1/4-3.3KF	
R110	"	", "	"	"	"	"	
R111, 112	G501810410	", "	10K	"	"	RN1/4-10KF	
R113	G501810310	", "	1K	"	"	RN1/4-1KF	
R114	G501810422	", "	22K	"	"	RN1/4-22KF	
R115, 116	G501810410	", "	10K	"	"	RN1/4-10KF	
R117	G501810247	", "	470Ω	"	"	RN1/4-470F	
R118	G501810410	", "	10K	"	"	RN1/4-10KF	
R119	G501810247	", "	470Ω	"	"	RN1/4-470F	
R120	G501810422	", "	22K	"	"	RN1/4-22KF	
R121 ~ 124	G501810410	", "	10K	"	"	RN1/4-10KF	
R125	G501810312	", "	1.2K	"	"	RN1/4-1.2KF	
R126	G501810215	", "	150Ω	"	"	RN1/4-150F	
R127	G501810510	", "	100K	"	"	RN1/4-100KF	

Figure	Part No.	Description				Type	Remarks
R128	G501810436	R, Metal Film	36K	1/4W	±1%	RN1/4-36KF	
R129	G501810447	", "	47K	"	"	RN1/4-47KF	
R130	G501810533	", "	330K	"	"	RN1/4-330KF	
R131	G501810410	", "	10K	"	"	RN1/4-10KF	
R132, 133	G501810456	", "	56K	"	"	RN1/4-56KF	
R134	G501810410	", "	10K	"	"	RN1/4-10KF	
R135	G501810422	", "	22K	"	"	RN1/4-22KF	
R136	G501810410	", "	10K	"	"	RN1/4-10KF	
R137	G501810322	", "	2.2K	"	"	RN1/4-2.2KF	
R138	G501810410	", "	10K	"	"	RN1/4-10KF	
R139	G501810520	", "	200K	"	"	RN1/4-200KF	
R140	G501810310	", "	1K	"	"	RN1/4-1KF	
R141	A501606731	", "	6.8Ω	5W	±5%	RSF5B-6.8J	
R142	G501810322	", "	2.2K	1/4W	±1%	RN1/4-2.2KF	
R143	G501810227	", "	270Ω	"	"	RN1/4-270F	
R145, 146	A501604703	", "	220Ω	1/2W	±5%	RSF1/2-220J	
R147, 148	G501810368	", "	6.8K	1/4W	±1%	RN1/4-6.8KF	
R149	G501810410	", "	10K	"	"	RN1/4-10KF	
R150	A501605732	", "	0.22Ω	3W	±5%	RSF3B-0.22J	
R151, 152	G501810151	", "	51Ω	1/4W	±1%	RN1/4-51F	
R153, 154	A501609723	", "	1Ω	3W	±5%	RSF3B-1J	
R155	G501810210	", "	100Ω	1/4W	±1%	RN1/4-100F	
R156	G501810410	", "	10K	"	"	RN1/4-10KF	
R157	G501810533	", "	330K	"	"	RN1/4-330KF	
R158	G501810422	", "	22K	"	"	RN1/4-22KF	
R144	G501810310	R, Metal Film	1K	1/4W	±1%	RN1/4-1KF	
R96	G501810422	" "	22K	"	"	RN1/4-22KF	
RA1	G501003346	Resistor Array	22K x 8			EXB-P8-8-223J	
RA2	G501003334	"	10K x 8			EXB-P8-8-103J	
RA3 ~ 6	G501003346	"	22K x 8			EXB-P8-8-223J	
VR1	A505103029	R, Trimmer	500K			GF06P-500K	
VR2	G505103027	", "	50K			GF06P-50K	
VR3	G505103022	", "	10K			GF06P-10K	
VR4	G505102027	", "	20K			GF06P-20K	
C1	G502403007	C, Ceramic	0.01μ	50WV		UFD06-103-L2A	
C2	A502102064	", Electrolytic	47μ	10WV		ECEA1AS470	
C3	G502203013	", Tantalum	1μ	35WV		CS15E1V010M	
C4	G502703021	", Mica	33P	100WV		Z05-33K100	
C5	"	", "	33P	100WV		"	
C6	G502403007	", Ceramic	0.01μ	50WV		UFD06-103-L2A	
C8	A502102064	", Electrolytic	47μ	10WV		ECEA1AS470	

Figure	Part No.	Description			Type	Remarks
C9	A502102026	C, Electrolytic	47μ	35WV	ECEA1VS470	
C11	G502303004	", Myler Film	0.01μ	50WV	MFL-05S1	
C12	G502303001	", "	0.0022μ	50WV	MFL-05D22	
C13	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C14	G502303002	", Myler Film	0.001μ	50WV	MFL-05D1	
C15	"	", "	0.001μ	50WV	"	
C17	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C18	G502203002	", Tantalum	10μ	16WV	CS15E1C100M	
C19	A502303019	", Myler Film	0.0015μ	50WV	MFL-05D15	
C20	A502103051	", Electrolytic	10μ	35WV	ECEA1VS100	
C22	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C23	G502203003	", Tantalum	3.3μ	16WV	CS15E1C3R3M	
C24	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C25 ~ 27	A502102029	", Electrolytic	47μ	16WV	ECEA1CS470	
C28	G502303004	", Myler Film	0.01μ	50WV	MFL-05S1	
C29	G502203024	", Tantalum	1.5μ	20WV	CS15E1D1R5M	
C30	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C31	A502303019	", Myler Film	0.0015μ	50WV	MFL-05D15	
C32	G502403029	", Ceramic	100P	50WV	UFD045SA101J-L0B	
C33, 34	A502103051	", Electrolytic	10μ	35WV	ECEA1VS100	
C35	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C36, 37	G502403029	", "	100P	50WV	UFD04SA101J-L0B	
C38	A502102029	", Electrolytic	47μ	16WV	ECEA1CS470	
C39	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C40	A502102026	", Electrolytic	47μ	35WV	ECEA1VS470	
C41	G502403007	", Ceramic	0.01μ	50WV	ULD06-103-L2A	
C42, 43	G502303004	", Myler Film	0.01μ	50WV	MFL-05S1	
C44	G502403007	", Ceramic	0.01μ	50WV	ULD06-103-L2A	
C45	G502403034	", "	33P	50WV	RAU04SL330KL05AE	
C46	G502203015	", Tantalum	0.47μ	35WV	CS15E1VR47M	
C47, 48	G502203002	", "	10μ	16WV	CS15E1C100M	
C50	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C51	G502303007	", Myler Film	0.0047μ	"	MFL-05D47	
C52	"	", "	0.0047μ	"	"	
C53	G502303004	", "	0.01μ	"	MFL-05S1	
C54	A502303019	", "	0.0015μ	"	MFL-05D15	
C55	G502303005	", "	0.047μ	"	MFL-05S47	
C57	A502102029	", Electrolytic	47μ	16WV	ECEA1CS470	
C58	G502102026	", "	47μ	35WV	ECEA1VS470	
C59	G502403007	", Ceramic	0.01μ	50WV	UFD06-103-L2A	
C60	"	", "	0.01μ	50WV	"	
C61	A502103034	", Electrolytic	100μ	10WV	ECEA1AS101	
C62, 63	A502403036	", Ceramic	680P	50WV	UFD04SA681J-L0B	
C64	A502102029	", Electrolytic	47μ	16WV	ECEA1CS470	
C65	A502403037	C, Electric	1000μ	50WV	FTE1G102	

Figure	Part No.	Description		Type	Remarks
S1	A508201010	Switch Push	1-2-2	2U0A	For FF
S2, 3	G508201018	Switch Push	1-2-2	2UEE	For STOP For sec/min
S4 ~ 10	A508202012	Switch Push	7-2-2	7FS-14U-R7690	For SPEED
S11	A508201010	Switch Push	1-2-2	2U0A	For RWD
S12	G508201018	Switch Push	1-2-2	2UEE	For HEAT
S13	A508201010	Switch Push	1-2-2	2U0A	For EVENT
S14	A508101015	Switch Rotary	1-2-6	DSR2-6	For TIME
S15	G508201018	Switch Push	1-2-2	2UEE	For EXT
S16	A508201010	Switch Push	1-2-2	2U0A	For PRT SET
For S1	B516100020	Cap, Black		B911	
For S2	A516100025	Cap, Ivory		B201	
For S3 ~ 16	B516100020	Cap, Black		B911	
For S14	B516100016	Knob, ϕ10mm, Black		021-222	
For S14	B516100018	Cap, ϕ10mm, Black		040-162	
F1, 2	A512300010	FUSE	2A	MC-2	
F3, 4	A512300025	FUSE	4A	MC-4	
TP2	B513400027	Check Pin		LC-1-G	
TP4 ~ 6	"	"		"	
TP8	"	"		"	
BZ	A519300001	Buzzer		SD161201	
For IC10	A513500412	IC Socket		DICF-16CS	
X1	A519105001	Crystal Oscillator	400kHz	HC-6/UW-400kHz	
For Q10	B520100012			30B6001	
For Q13, 14	"			"	
For Q16	"			"	
For IC16	"			"	
For CR59	"			"	
PCB	A511350040	Printed Circuit Board		PR3500-04	



No	TYPE	Vdd	Vss
1	M74LS348	16	8
2	TC40174	16	8
3	MB2764	28	14
4	M74LS368	16	8
5	TC40174	16	8
6	M74LS04	14	7
7	RPSC15	18	9
8	M74LS138	16	8
9	MD6803	7	1
10	M74LS74	14	7
11	M74LS04	14	7
12	DN74LS00	14	7
13	MD7407	14	7
14	MD7407	14	7
15	MPC1555	8	1
16	AN7805		

No	SIG
10	PH1
9	PH2
8	PH3
7	PH4
6	PH5
5	PH6
4	PH7
3	GND
2	PHR1
1	PHR2

No	SIG
1	GND
2	GND
3	EXT
4	+24V
5	+24V
6	+5V
7	+5V
8	SET
9	FEED
10	PNT. OFF

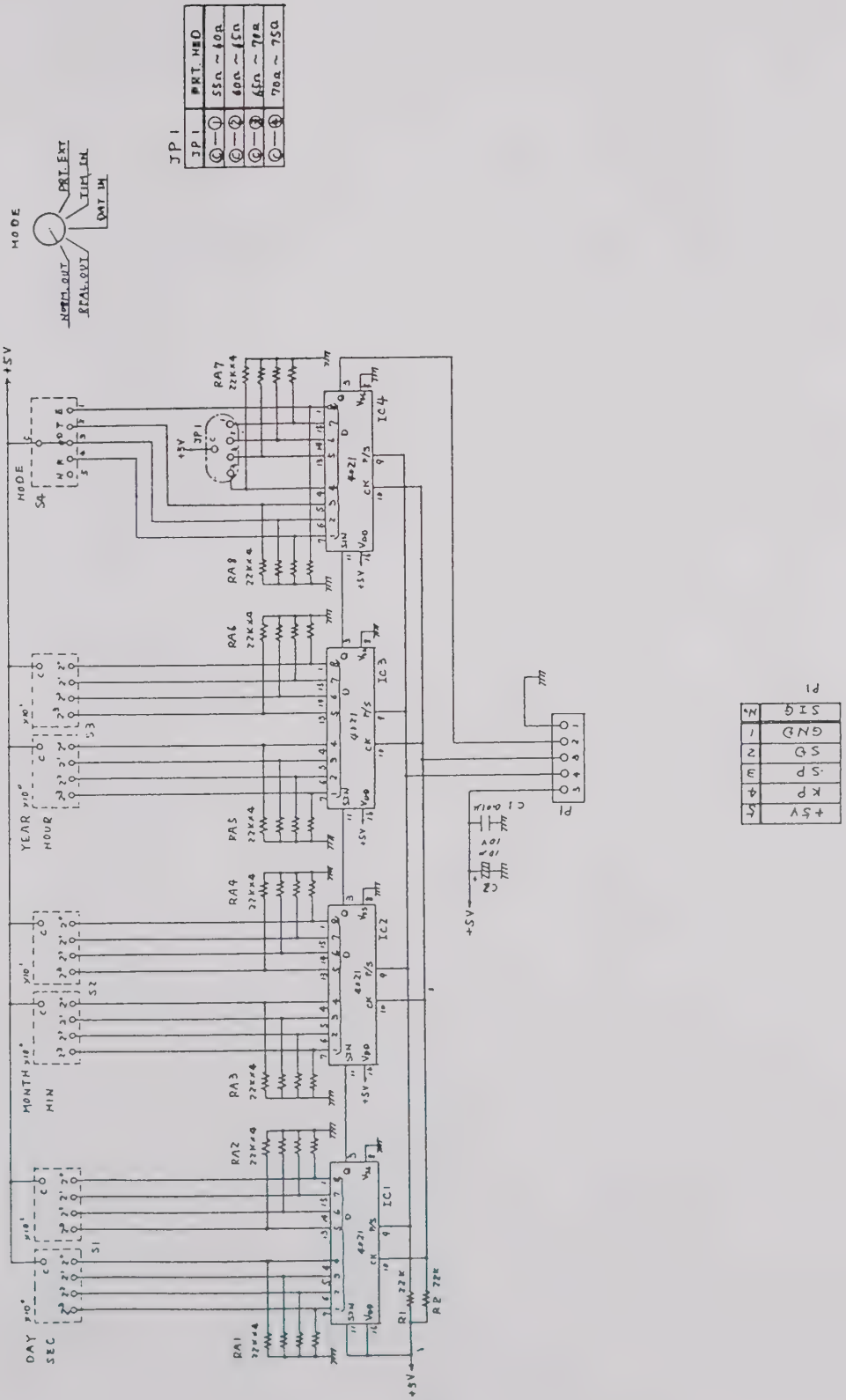
STB	No	SIG
STB	A1 B1	+5V
DI 6	A2 B2	DI 7
DI 5	A3 B3	BUSY
DI 4	A4 B4	GND
DI 3	A5 B5	GND
DI 2	A6 B6	N.C
DI 1	A7 B7	ACK
DI 0	A8 B8	BUSY

No	SIG
1	SIG
2	+5V
3	Vsm
4	GND

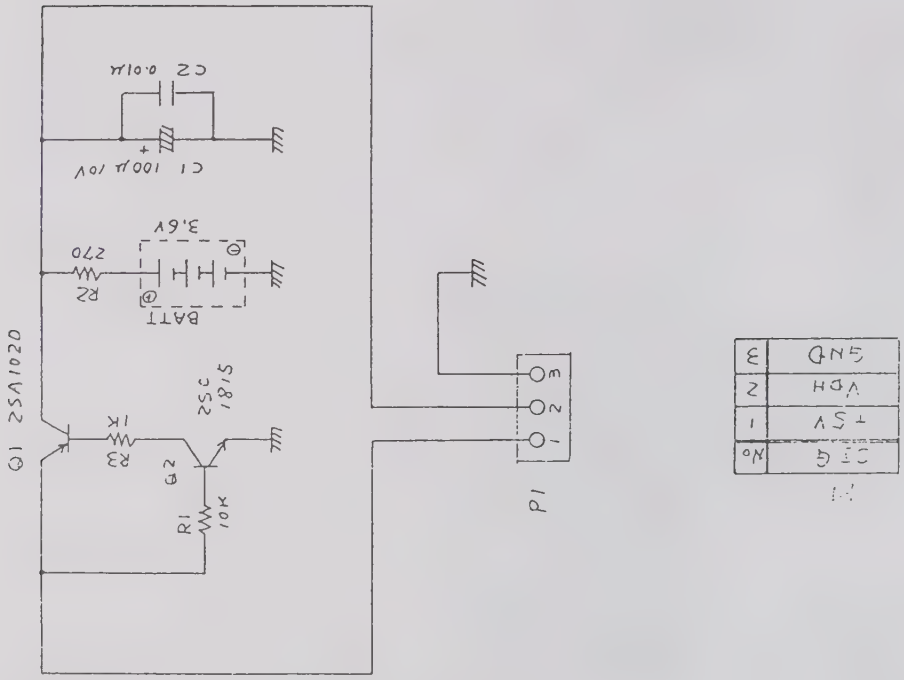
No	SIG
1	GND
2	SD
3	SP
4	KP
5	+5V

5-10 PRINTER CONT (1/3)

PRINTER CONT (2/3)



PRINTER CONT (3/3)



No.	SIG
1	+5V
2	VDH
3	GND

Printer Cont

Figure	Part No.	Description	Type	Remarks
IC1	A503303469	IC, TTL Hex Bus Drivers	M74LS368AP	
IC2	G503300141	" , CMOS Hex Type D Flip Flop	TC40174BP	
IC3	A503301052	" , EP-ROM	MB2764-30	
IC4	A503303469	" , TTL Hex Bus Drivers	M74LS368AP	
IC5	G503300141	" , CMOS Hex Type D Flip Flop	TC40174BP	
IC6	A503303471	" , TTL Hex Inverters	M74LS04P	
IC7	A503303824	" , CMOS Real Time Clock	RP5C15	
IC8	A503303472	" , TTL 3-IN to 8-Line Decorder	M74LS138P	
IC9	A503303435	" , CPU	HD6803, CPU	
IC10	A503303470	" , TTL Dual Type D Flip Flop	M74LS74AP	
IC11	A503303471	" , TTL Hex Inverters	M74LS04P	
IC12	A503300138	" , TTL Quad 2-IN NAND	DN74LS00	
IC13, 14	A503303784	" , TTL Hex Buffers O.C.	HD7407	
IC15	A503303473	" , Timer	μPC1555C	
IC16	A503301059	" , Voltage Regulator 5V 1A	AN7805	
Q1, 2	G503203014	T, NPN 30V 100mA 200mV	2SC1815, Y	
Q3 ~ 9	G503203019	T, PNP −50V −2A 900mV	2SA1020, Y	
CR1	G503100020	Di, Si V_R = 30V I_F = 0.1A	IS953	
CR2	G503100058	Di, Zener 4.2V 1/2W ±5%	RD4.3EB3	
R1	G501810210	R, Metal Film 100 1/4W ±1%	RN1/4-100F	
R3, 4	G501810418	" , " 18K " "	RN1/4-18KF	
R5	G501810230	" , " 300 " "	RN1/4-300F	
R6	G501810418	" , " 18K " "	RN1/4-18KF	
R7, 8	G501810210	" , " 100 " "	RN1/4-100F	
R9	G501605711	" , " 1Ω 1W ±5%	RSF1B-1J	
R10	G501810391	" , " 9.1K 1/4W ±1%	RN1/4-9.1KF	
R11	G501810447	" , " 47K " "	RN1/4-47KF	
R12 ~ 18	G501810312	" , " 1.2K " "	RN1/4-1.2KF	
R19	G501810347	" , " 4.7K " "	RN1/4-4.7KF	
RA1 ~ 6	B501003331	Resister Array 10K x 8	EXBP8-8-103J	
C1	G502403007	C, Ceramic 0.01μ 50WV	ULD06-103-L2A	
C2	A502103034	", Electrolytic 100μ 10WV	ECEA1AS101	
C3	G502403015	", Ceramic 1000P 50WV	ULD06-102	
C6, 7	G502703007	", Mica 15P 100WV	Z05-100V15P	
C8	G502203002	", Tantalum 10μ 16WV	CS15E1C100M	
C9	G502403007	", Ceramic 0.01μ 50WV	ULD06-103-L2A	
C10	A502103050	", Electrolytic 33μ 10WV	ECEA1AS330	
C11	G502203013	", Tantalum 10μ 16WV	CS15E1C100M	
C12	G502403015	", Ceramic 1000P 50WV	ULD06-102	
C13, 14	G502403007	", " 0.01μ 50WV	ULD06-103-L2A	

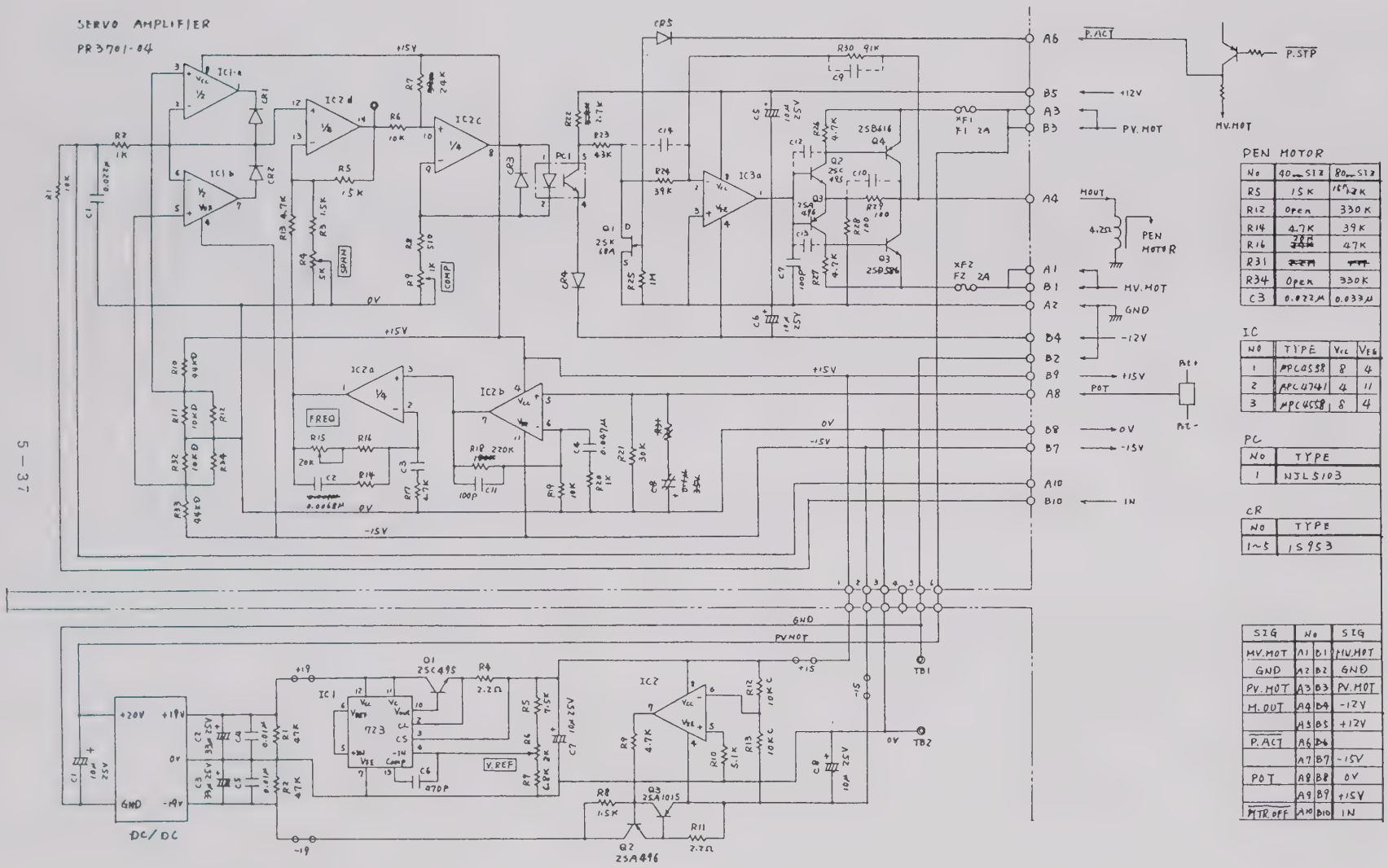
Figure	Part No.	Description	Type	Remarks
C15	G502303008	C, Myler Film 0.022μ 50WV	MFL-05S22	
C16	G502303002	", " 0.001μ 50WV	MFL-05D1	
C17	A502103049	", Electrolytic 1000μ 35WV	ECEB1VS102	
C18	G502303002	", Myler Film 0.001μ 50WV	MFL-05D1	
C19	G502403007	", Ceramic 0.01μ 50WV	ULD06-103-L2A	
C20	G502403005	", " 0.1μ 50WV	TLD14F-104	
C21	G502403007	", " 0.01μ 50WV	ULD06-103-L2A	
C22	G502103050	", Electrolytic 33μ 10WV	ECEA1AS330	
Y1, C4, 5	A519105006	Oscillator 4MHz	KBR-4.0M	
Y2	A502901015	" 32.768kHz	KF38G	
P3	G513400068	Connector, Pin Header 10P	HNC2-2.5P-10DSL	
P4	G513400045	" " 5P	HNC2-2.5P-5DSL	
For IC3	A513400119	IC-Socket 28P	228-AG29D	
PCB	A511350070	Printed Circuit Board	PR3500-07A	

Printer Cont Sw

Figure	Part No.	Description	Type	Remarks
IC1 ~ 4	G503300131	IC, CMOS 8 Stage Shift Resister	TC4021BP	
R1, 2	G501810422	R, Metal Film 22K 1/4W ±1%	RN1/4-22KF	
RA1 ~ 8	G501102745	Resister Array 22K x 4	RKC1/8B422Kohm K	
C1	G502403007	C, Ceramic 0.01μ 50WV	ULD06-103-L2A	
C2	G502303002	C, Tantalum 10μ 16WV	SC15E1C100M	
P1	G513400044	Connector, Receptacle 5P	HNC2-2.5S-5	
For P1	G513400037	Contact Pin for HNC2-2.5 TYP	HNC2-2.5S-A	
S1 ~ 3	G508401012	Switch, Thumb Wheel Digit	A7MA-206-P2	
For S1 ~ 3	G508401013	SW Hook	A7M-2M	
For S1 ~ 3	G508401015	SW Spacer	Spacer, A7M-2PA	
S4	A507111113	Switch, Rotary 1-5	JRA1-12, Stopper	
PCB	A511350090	Printed Circuit Board	PR3500-09	

Printer Cont Backup

Figure	Part No.	Description				Type	Remarks
Q1	G503203019	T, PNP	−50V	−2A	900WV	2SA1020, Y	
Q2	G503203014	T, NPN	30V	100mA	200mW	2SC1815, Y	
R1	G501810410	R, Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R2	G501810227	R, "	270	"	"	RN1/4-270F	
R3	G501810310	R, "	1K	"	"	RN1/4-1KF	
C1	A502103034	C, Electrolytic	100μ	10WV		ECEA1AS101	
C2	G502403007	", Ceramic	0.01μ	50WV		ULD06-103-L2A	
BATT	A517100006	Battery	3.6V			Battery, 3-51FT-P	
P1	G513400060	Connector, Pin Header		3P		HNC2-2.5P-3DSL	
PCB	A511350080	Printed Circuit Board				PR3500-08	



PEN MOTOR

No	40 SIZ	80 SIZ
R5	1.5K	1.8K
R12	Open	330K
R14	4.7K	39K
R16	~~22K~~	4.7K
R31	~~22K~~	~~4.7K~~
R34	Open	330K
C3	0.022μ	0.033μ

IC

No	TYPE	V_{CC}	V_{EE}
1	μPC4558	8	4
2	μPC4741	4	11
3	μPC4558	8	4

PC

No	TYPE
1	NJL5103

CR

No	TYPE
1~5	1S953

SIG	No		SIG
MV.MOT	A1	B1	MV.MOT
GND	A2	B2	GND
PV.MOT	A3	B3	PV.MOT
M.OUT	A4	B4	-12V
	A5	B5	+12V
$\overline{\text{P.ACT}}$	A6	B6	
	A7	B7	-15V
POT	A8	B8	0V
	A9	B9	+15V
$\overline{\text{MTR OFF}}$	A10	B10	IN

Servo Amplifier

Figure	Part No.	Description				Type	Remarks
IC1	A503300054	IC, Op-Amp Dual				μPC4558C	
IC2	A503300034	" , Op-Amp Quardruple				μPC4741	
IC3	A503300054	" , Op-Amp Dual				μPC4558C	
PC1	G503300108	Photo Coupler	I_F = 70mA I_C = 100mA 60% ≤ CTR ≤ 150%			NJL5103D	
Q1	G503203015	Tr, N-J-FET				2SK68A	
Q2	G503200011	" , NPN	50V	1A	1W	2SC495.0	
Q3	G503200003	" , PNP	−50V	−1A	1W	2SA496, Y	
Q4	G503200018	" , PNP	−80V	−5A	60W	2SB616, R	
Q5	G503200021	" , NPN	80V	5A	60W	2SD586, R	
CR1 ~ 5	G503200020	Di, Si	V_R = 30V	I_F = 0.1A		IS953	
R1	G501810410	R, Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R2	G501810310	" , "	1K	"	"	RN1/4-1KF	
R3	G501810315	" , "	1.5K	"	"	RN1/4-1.5KF	
R4	G504207048	" , Variable	5K			TM10KPH-5K	For Span
R5	G501810415	" , Metal Film	15K	1/4W	±1%	RN1/4-15KF	
R6	G501810410	" , "	10K	"	"	RN1/4-10KF	
R7	G501810424	" , "	24K	"	"	RN1/4-24KF	
R8	G501810251	" , "	510Ω	"	"	RN1/4-510F	
R9	G504207049	" , Variable	1K			TM10KPH-1K	For Comp
R10	A501303444	" , Metal Film	44K	1/4W	±0.5%	RNE1/4-44KD	
R11	G501303408	" , "	10K	"	"	RNE1/4-10KD	
R13, 14	G501810347	" , "	4.7K	"	±1%	RN1/4-4.7KF	
R15	G504207031	" , Variable	20K			TM10KPH-20K	For Freq
R16	G501810420	" , Metal Film	20K	1/4W	±1%	RN1/4-20KF	
R17	G501810347	" , "	4.7K	"	"	RN1/4-4.7KF	
R18	G501810522	" , "	220K	"	"	RN1/4-220KF	
R19	G501810410	" , "	10K	"	"	RN1/4-10KF	
R20	G501810310	" , "	1K	"	"	RN1/4-1KF	
R21	G501810430	" , "	30K	"	"	RN1/4-30KF	
R22	G501810327	" , "	2.7K	"	"	RN1/4-2.7KF	
R23	G501810443	" , "	43K	"	"	RN1/4-43KF	
R24	G501810439	" , "	39K	"	"	RN1/4-39KF	
R25	G501810610	" , "	1M	"	"	RN1/4-1MF	
R26, 27	G501810347	" , "	4.7K	"	"	RN1/4-4.7KF	
R28, 29	G501810210	" , "	100Ω	"	"	RN1/4-100F	
R30	G501810491	" , "	91K	"	"	RN1/4-91KF	
R31		" , "		"	"		
R32	G501303408	" , "	10K	"	±0.5%	RNE1/4-10KD	
R33	A501303444	" , "	44K	"	"	RNE1/4-44KD	

Figure	Part No.	Description				Type	Remarks
R12, 34	G501810533	R, Metal Film	33K	1/4W	±1%	RN1/4-330KF	For 80mm
R14	G501810439	", "	39K	"	"	RN1/4-39KF	For 80mm
R16	G501810447	", "	47K	"	"	RN1/4-47KF	For 80mm
C1	G502303008	C, Myler Film	0.022μ	50WV		MFL05S22	
C2	G502303013	", "	0.0068μ	"		MFL05D68	
C3	G502303008	", "	0.022μ	"		MFL05S22	For 40mm
C4	G502303005	", "	0.047μ	"		MFL05S47	
C5, 6	A502901007	", Electrolytic	10μ	25WV		ECEA1ES100	
C7	G502403009	", Ceramic	100P	50WV		UFD04-101K-K2J	
C8		",					
C3	G502303009	", Myler Film	0.033μ	50WV		MFL05S33	For 80mm
C11	G502403009	", Ceramic	100P	50WV		UFD04-101K-K2J	
F1, 2	G512300011	Fuse	2A			7142-2A	
XF1, 2	A512400008	Fuse Holder				0G751-0056	
PCB	A511370040	Printed Circuit Board				PR3701-04A	
TB1, 2	B513400027	Test Terminal				LC-1-G	

Stabilizer

Figure	Part No.	Description				Type	Remarks
IC1	A503300117	IC, Voltage Regulator				HA17723G	
IC2	G503300054	" , Op-Amp Dual				μPC4558C	
Q1	G503200011	Tr, NPN	50V	1A	1W	2SC495	
Q2	G503200003	" , PNP	−50V	−1A	1W	2SA496	
Q3	G503203016	" , "	−30V	−100mA	0.2W	2SA1015	
R1	G501810447	R, Metal Film	47K	1/4W	±1%	RN1/4-47KF	
R2	"	", "	"	"	"	"	
R4	G501203701	", Solid	2.2Ω	"	±5%	RC1/4-2.2J	
R5	G501810375	", Metal Film	7.5K	"	±1%	RN1/4-7.5KF	
R6	G504207022	", Variable	2K			TM10KPH-2K	For Stb
R7	G501810368	", Metal Film	6.8K	1/4W	±1%	RN1/4-6.8KF	
R8	G501810315	", "	1.5K	"	"	RN1/4-1.5KF	
R9	G501810347	", "	4.7K	"	"	RN1/4-4.7KF	
R10	G501810351	", "	5.1K	"	"	RN1/4-5.1KF	
R11	G501203701	", Solid	2.2Ω	"	±5%	RC1/4-2.2J	
R12	G501303307	", Metal Film	10K	"	±0.25%	RNE1/4-10KC	
C1	G502103023	C, Electrolytic	10μ	25WV		SM25VB-10	
C2	G502103011	", "	33μ	"		SL25VB-33	
C3	"	" "	"	"		"	
C4	G502403007	", Ceramic	0.01μ	50WV		ULD06-103-L2A	
C5	"	" "	"	"		"	
C6	G502403003	", Ceramic	470P	"		USD04-SL-471K	
C7	G502103023	", Electrolytic	10μ	25WV		SM25VB-10	
C8	"	" "	"	"		"	
DC/DC	A518100007	DC/DC Converter				GE0322A	
TB1	B513400027	Test Terminal				LC-1-G	
PCB	A511311150	P.C.B.				PR3111-05	

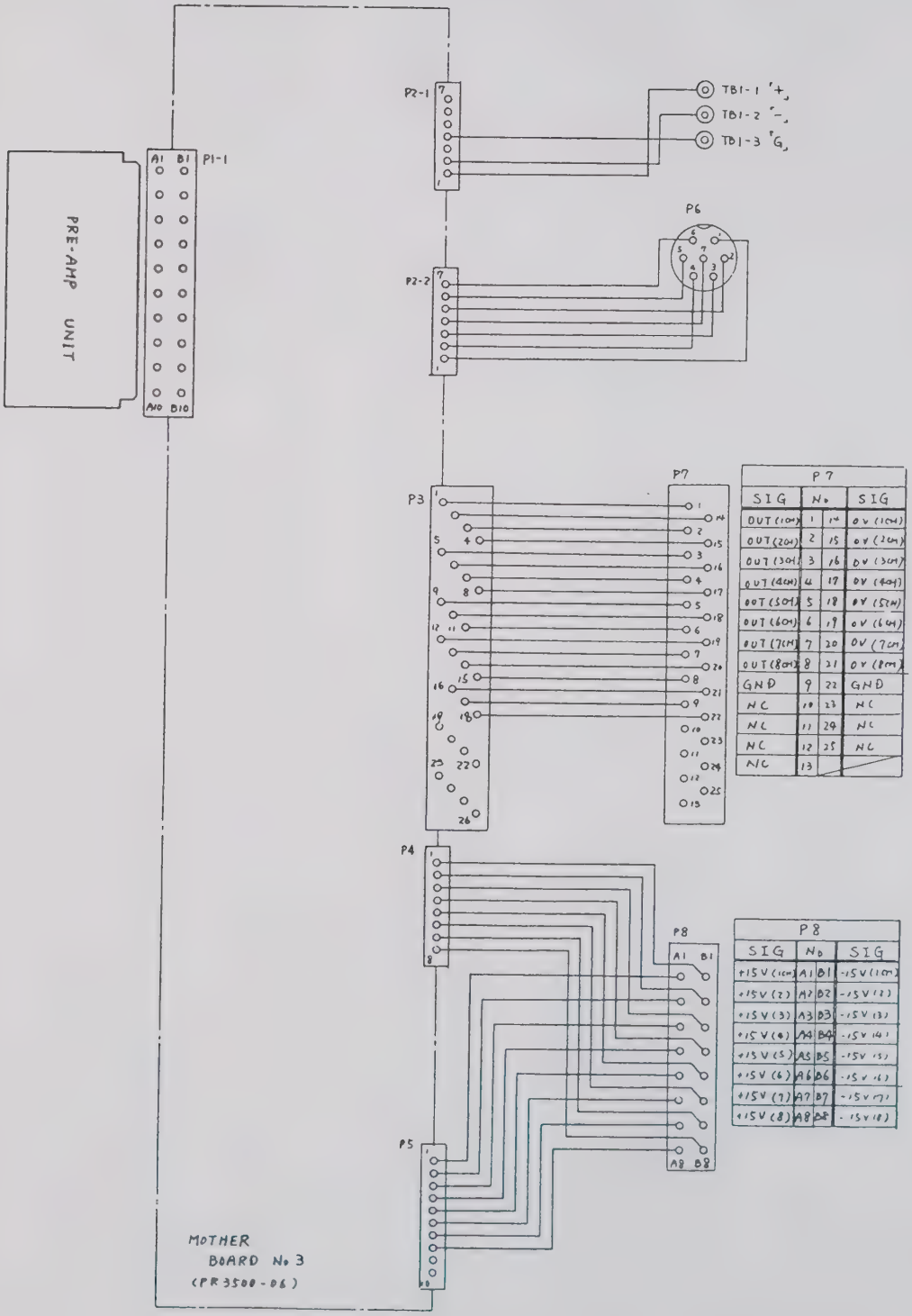
Heat Control

Figure	Part No.	Description				Type	Remarks
IC1 ~ 3	A503300054	IC, Op-Amp Dual				μPC4558C	
IC4	A503301152	" ,				WS-1801	
IC5 ~ 7	A503300054	" , Op-Amp				μPC4558C	
IC8	A503301152	" ,				WS-1801	
PC1, 2	G503300108	Photo Coupler	I_F = 70mA I_C = 100mA 60% ≤ CTR ≤ 150%			NJL5103D	
Q1	G503203014	T, NPN	30V	100mA	0.2W	2SC1815.Y	
Q2	A503203047	", NPN	60V	3A	30W	2SD880	
Q3	G503203014	", NPN	30V	100mV	0.2W	2SC1815.Y	
Q4	A503203047	", NPN	60V	3A	30W	2SD880	
CR1	A512100027	LED				GL-5EG21	
CR2, 3	G503100020	Di, Si	V_R = 30V	I_F = 0.1A		IS953	
CR4	A512100027	LED				GL-5EG21	
CR5, 6	G503100020	Di, Si	V_R = 30V	I_F = 0.1A		IS953	
R1	A504207055	R, Trimmer	10K x 4			EVU-P8AS10B14	For POS · H.CNT
R2	G505102027	" , Trimmer	20K			GF06P-20K	For Bas
R4	G501810410	" , Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R6	G501810491	" , "	91K	"	"	RN1/4-91KF	
R7	G501810418	" , "	18K	"	"	RN1/4-18KF	
R8	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R9, 10	G501810420	" , "	20K	"	"	RN1/4-20KF	
R11, 12	G501810336	" , "	3.6K	"	"	RN1/4-3.6KF	
R13	G501810310	" , "	1K	"	"	RN1/4-1KF	
R14	G501810343	" , "	4.3K	"	"	RN1/4-4.3KF	
R15	B503400005	" , Thermister				10KD7-15%	
R16	G501810320	" , Metal Film	2K	1/4W	±1%	RN/4-2KF	
R17	G501810418	" , "	18K	"	"	RN1/4-18KF	
R18	G501810318	" , "	1.8K	"	"	RN1/4-1.8KF	
R19	G501810327	" , "	2.7K	"	"	RN1/4-2.7KF	
R20	G501810410	" , "	10K	"	"	RN1/4-10KF	
R21	G501810310	" , "	1K	"	"	RN1/4-1KF	
R22	G501810247	" , "	470Ω	"	"	RN1/4-470F	
R23	G501810410	" , "	10K	"	"	RN1/4-10KF	
R24	G501810520	" , "	200K	"	"	RN1/4-200KF	
R25	G501810343	" , "	4.3K	"	"	RN1/4-4.3KF	
R26	G505102036	" , Trimmer	1K			GF06P-1K	For Zero
R27, 28	G505102027	" , "	20K			GF06P-20K	For Bal 1, 2
R29	G505102036	" , "	1K			GF06P-1K	For Comp
R30	G501810227	" , Metal Film	270Ω	1/4W	±1%	RN1/4-270F	
R31	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R32	G501810322	" , "	2.2K	"	"	RN1/4-2.2KF	

Figure	Part No.	Description				Type	Remarks
R33	G501810251	R, Metal Film	510Ω	1/4W	±1%	RN1/4-510F	
R34	G501810410	" , "	10K	"	"	RN1/4-10KF	
R35	G501810491	" , "	91K	"	"	RN1/4-91KF	
R36	G501810510	" , "	100K	"	"	RN1/4-100K	
R37	G501810310	" , "	1K	"	"	RN1/4-1KF	
R38	G501304701	" , "	15Ω	1/2W	±5%	RNE1/2-15J	
R41		" ,				EVU-P8AS10B14	For POS · H.CNT
R42	G505102027	" , Trimmer	20K			FD06P-20K	For Bas
R44	G501810410	" , Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R46	G501810491	" , "	91K	"	"	RN1/4-91KF	
R47	G501810418	" , "	18K	"	"	RN1/4-18KF	
R48	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R49, 50	G501810420	" , "	20K	"	"	RN1/4-20KF	
R51, 52	G501810336	" , "	3.6K	"	"	RN1/4-3.6KF	
R53	G501810310	" , "	1K	"	"	RN1/4-1KF	
R54	G501810343	" , "	4.3K	"	"	RN1/4-4.3KF	
R55	B503400005	" , Thermister				10KD7-15%	
R56	G501810320	" , Metal Film	2K	1/4W	±1%	RN1/4-2KF	
R57	G501810418	" , "	18K	"	"	RN1/4-18KF	
R58	G501810318	" , "	1.8K	"	"	RN1/4-1.8KF	
R59	G501810327	" , "	2.7K	"	"	RN1/4-2.7KF	
R60	G501810410	" , "	10K	"	"	RN1/4-10KF	
R61	G501810310	" , "	1K	"	"	RN1/4-1KF	
R62	G501810247	" , "	470Ω	"	"	RN1/4-470F	
R63	G501810410	" , "	10K	"	"	RN1/4-10KF	
R64	G501810520	" , "	200K	"	"	RN1/4-200KF	
R65	G501810343	" , "	4.3K	"	"	RN1/4-4.3KF	
R66	G505102036	" , Trimmer	1K			GF06P-1K	For Zero
R67, 68	G505102027	" , "	20K			GF06P-20K	For Bal 1, 2
R69	G505102036	" , "	1K			GF06P-1K	For Comp (40mm)
R70	G501810227	" , Metal Film	270Ω	1/4W	±1%	RN1/4-270F	
R71	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R72	G501810322	" , "	2.2K	"	"	RN1/4-2.2KF	
R73	G501810251	" , "	510Ω	"	"	RN1/4-510F	
R74	G501810410	" , "	10K	"	"	RN1/4-10KF	
R75	G501810491	" , "	91K	"	"	RN1/4-91KF	
R76	G501810510	" , "	100K	"	"	RN1/4-100KF	
R77	G501810310	" , "	1K	"	"	RN1/4-1KF	
R78	G501804701	" , "	15Ω	1/2W	±5%	RNE1/2-15J	
R80	G501810110	" , "	10Ω	1/4W	±1%	RN1/4-10F	
R69	G505102026	" , Trimmer	2K			GF06P-2K	For Comp (80mm)
R62	G501810310	" , Metal Film	1K	1/4W	±1%	RN1/4-1KF	For 80mm

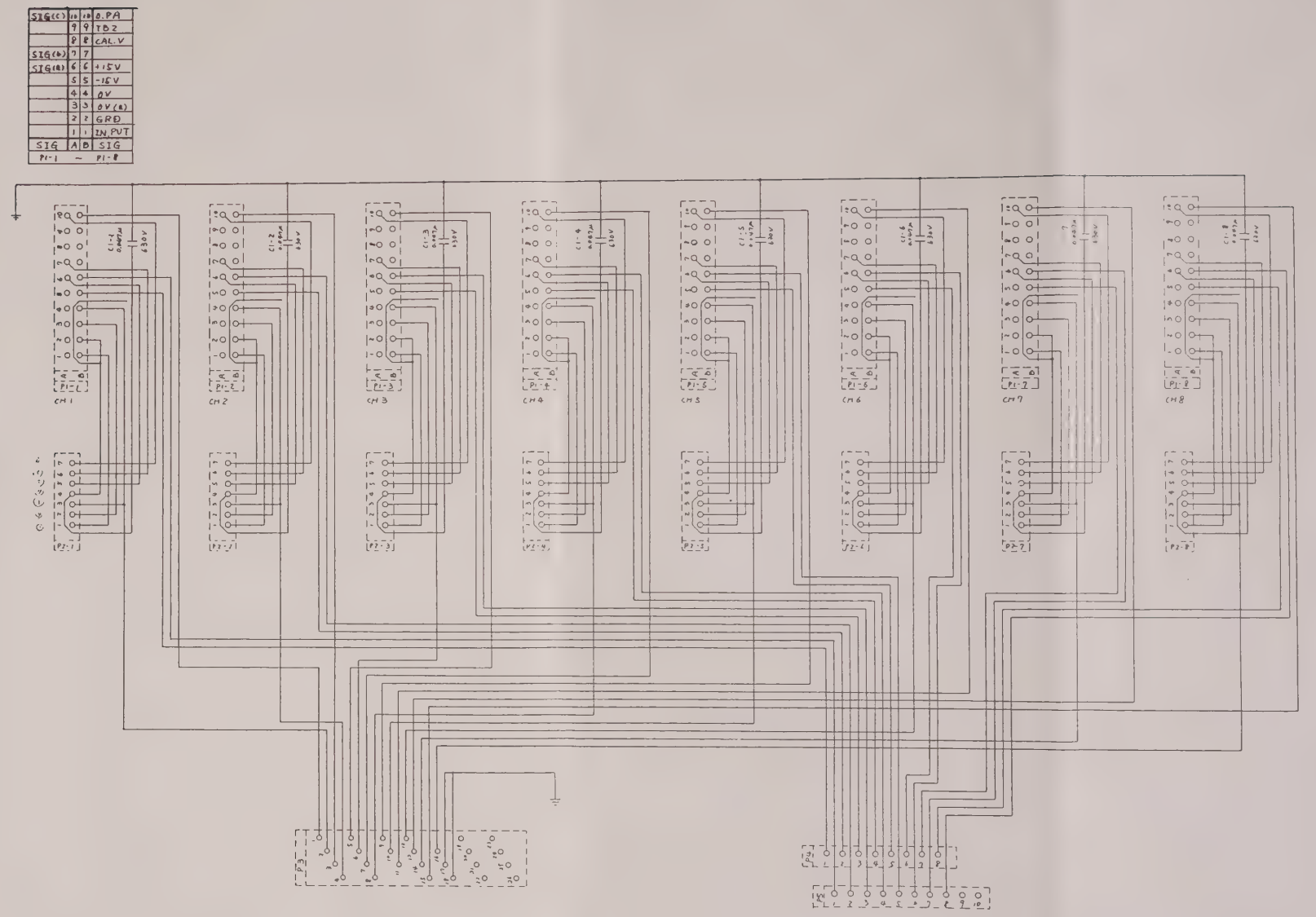
Figure	Part No.	Description			Type	Remarks
C1, 2	G502203024	C, Tantalum	1.5μ	20WV	CS16E1D1R5M	
C3, 4	A502102032	", Electrolytic	47μ	25WV	ECEA1AES470	
C5, 6	G502203024	", Tantalum	1.5μ	20WV	CS15E1D1R5M	
C7 ~ 10	A502102032	", Electrolytic	47μ	25WV	ECEA1AES470	
TB1 ~ 11	G513400027	Test Terminal			LC-1-G	
For Q2, 4	B520100012				30B6001	
S1, 2	G508201018	Switch Push			2UEE	
For S1, 2	B516100020	Cap, Black			B911	
For R1, 41		Knob			MSA-14S3.6	
For R1, 41		"			MSA-19W6.1	
JP1 ~ 8		Connector			C650-2030T004	
For JP1 ~ 8		"			FCN059J102GB	
PCB		Printed Circuit Board			PR3500-05	

5 – 13 WIRING (AMP BOX)



P7		
SIG	No	SIG
OUT (1CH)	1	14 0V (1CH)
OUT (2CH)	2	15 0V (2CH)
OUT (3CH)	3	16 0V (3CH)
OUT (4CH)	4	17 0V (4CH)
OUT (5CH)	5	18 0V (5CH)
OUT (6CH)	6	19 0V (6CH)
OUT (7CH)	7	20 0V (7CH)
OUT (8CH)	8	21 0V (8CH)
GND	9	22 GND
NC	10	23 NC
NC	11	24 NC
NC	12	25 NC
NC	13	

P8			
SIG	No		SIG
+15V (1CH)	A1	B1	-15V (1CH)
+15V (2)	A2	B2	-15V (2)
+15V (3)	A3	B3	-15V (3)
+15V (4)	A4	B4	-15V (4)
+15V (5)	A5	B5	-15V (5)
+15V (6)	A6	B6	-15V (6)
+15V (7)	A7	B7	-15V (7)
+15V (8)	A8	B8	-15V (8)



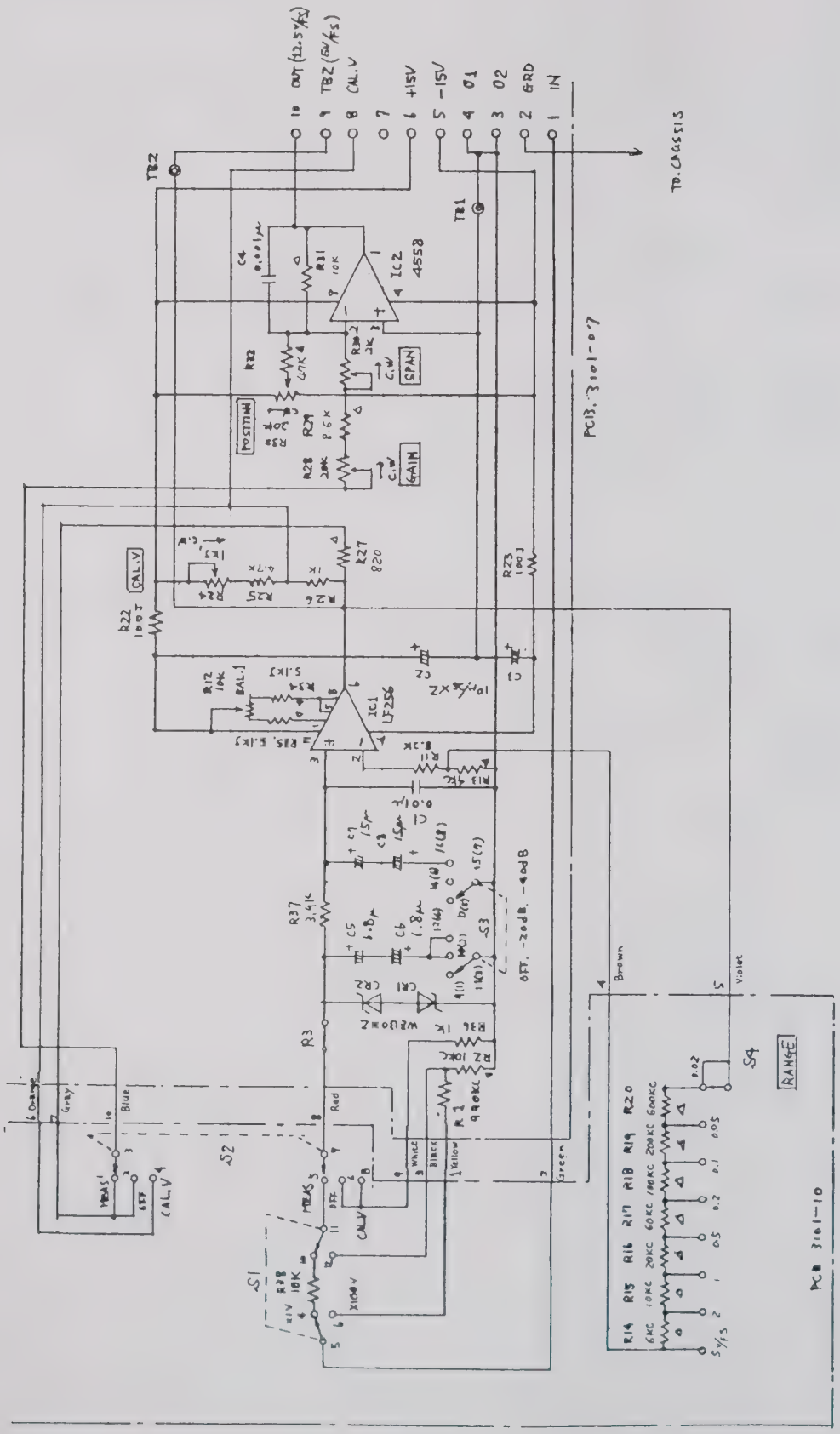
5 – 14 MOTHER BOARD No. 3

Wiring (Amp Box)

Figure	Part No.	Description	Type	Remarks
TB1	514400010	Terminal, Red	W-R-3	For INPUT +
TB2	514400010	" Red	W-R-3	For INPUT –
TB3	514400011	" Black	W-B-3	For INPUT G
P6		Connector Plug 7P		For INPUT
P7	520110141	" 25P	FC. L300-25, FCN	For AMP-OUT
P8	513400051	" Plug 16P	FCN361J016-AG	For AMP-POWER
J4	513400080	Connector Receptacle 8P	HNC2-2.5S-8	
J5	513400072	" " 10P	HNC2-2.5S-10	
	513400037	Contact Pin for HNC2-2.5 TYP	HNC-2.5S-A	

Mother Board No. 3

Figure	Part No.	Description	Type	Remarks
C1-1 ~ 1-8	502601003	C, Oil 0.047μ 630WV	PMA-2J-473	
P1-1 ~ 1-8	513300604	Connector 20P	225J21021-487	
P3	520110141	" Plug 25P	FCL300-25, FCN	
P4	513400079	" " 8P	HNC2-2.5P-8DS	
P5	513400075	" " 10P	HNC2-2.5P-10DS	
PCB	511350060	P.C.B.	PR3500-06	

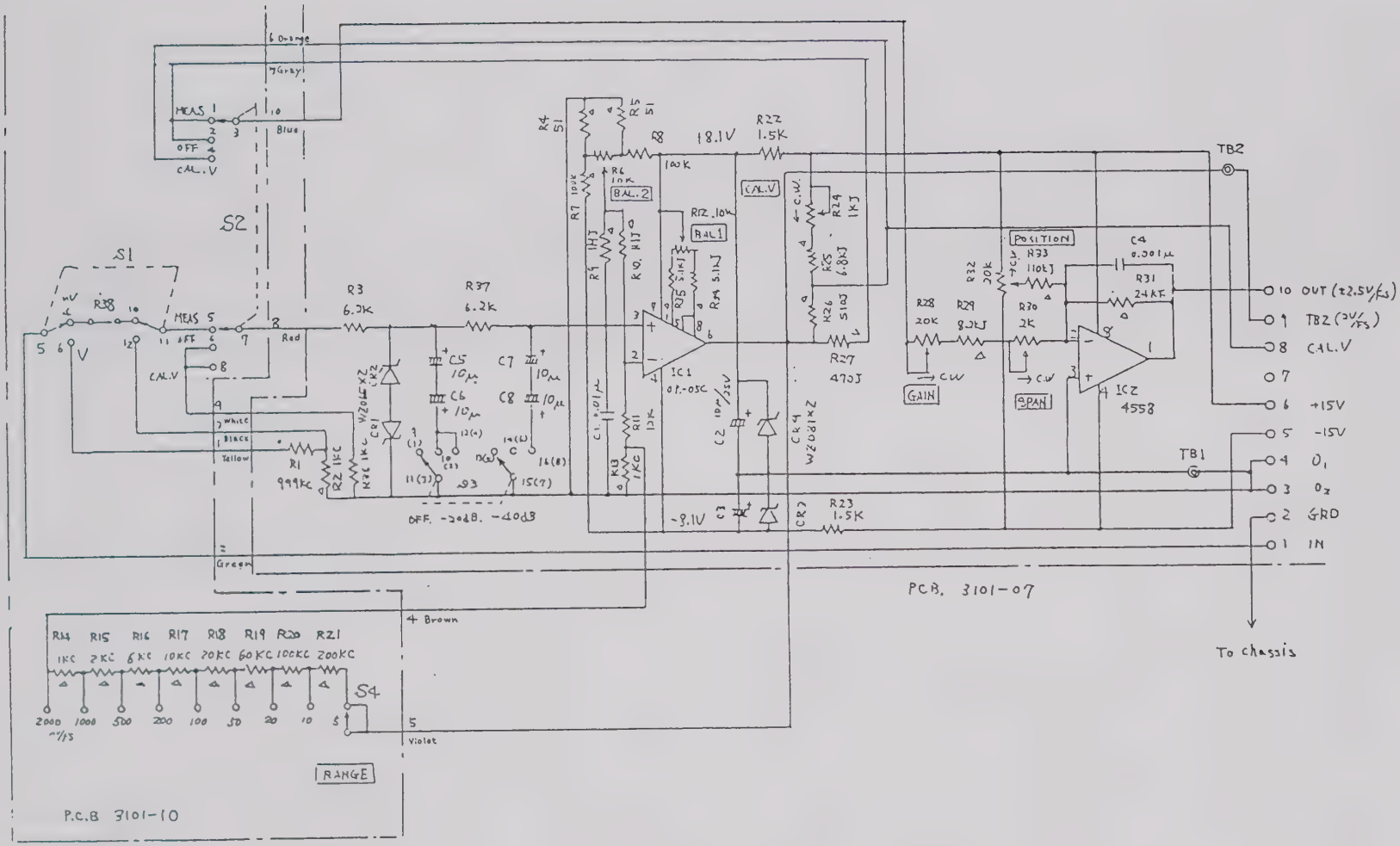


Note 1) MARK "." : 25P.P.M/°C
MARK "-" : 100P.P.M/°C
2) TRIMER R30 have been set from ohm.
3) RANGE OF AL : "( )"
4) R3 : SHORT

Amp Unit (Type L)

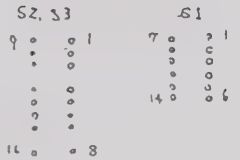
Figure	Part No.	Description				Type	Remarks
IC1	A503300130	IC, Op-Amp				TDE0156CM	
IC2	A503300054	" , Op-Amp Dual				UPC4558C	
CR1	G503100005	Di, Zener	13V	0.5W	±5%	RD13EB2	
CR2	"	" , "	"	"	"	"	
R1	G501503301	R, Metal Film	990K	1/2W	±0.25%	RN65E990KC	
R2	G501303307	" , "	10K	1/4W	"	RNE1/4-10KC	
R11	G501810382	" , "	8.2K	"	±1%	RN1/4-8.2KF	
R12	G504207021	" , Variable Carbon	10K			RVTM10KPH-10K	For Bal 1
R13	G501303308	" , Metal Film	4K	1/4W	±0.25%	RNE1/4-4KC	
R14	A501303318	" , "	6K	"	"	RNE1/4-6KC	
R15	G501303307	" , "	10K	"	"	RNE1/4-10KC	
R16	G501303310	" , "	20K	"	"	RNE1/4-20KC	
R17	A501303319	" , "	60K	"	"	RNE1/4-60KC	
R18	A501303320	" , "	100K	"	"	RNE1/4-100KC	
R19	G501303313	" , "	200K	"	"	RNE1/4-200KC	
R20	A501303339	" , "	600K	"	"	RNE1/4-600KC	
R22	G501810210	" , "	100	"	±1%	RN1/4-100F	
R23	"	" , "	"	"	"	"	
R24	G504207049	" , Variable Carbon	1K			RVTM10KPH-1K	For Cal
R25	G501810347	" , Metal Film	4.7K	1/4W	±1%	RN1/4-4.7KF	
R26	G501810310	" , "	1K	"	"	RN1/4-1KF	
R27	G501810282	" , "	270	"	"	RN1/4-270F	
R28	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	For GAIN
R29	A501810386	" , Metal Film	8.6K	1/4W	±1%	RN1/4-8.6KF	
R30	G504207022	" , Variable Carbon	2K			RVTM10KPH-2K	For Span
R31	G501810410	" , Metal Film	10K	1/4W	±1%	RN1/4-10KF	
R32	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	For POSI
R33	G501810447	" , Metal Film	47K	1/4W	±1%	RN1/4-47KF	
R34	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R35	"	" , "	"	"	"	"	
R36	G501810310	" , "	1K	"	"	RN1/4-1KF	
R37	G501810339	" , "	3.9K	"	"	RN1/4-3.9KF	
R38	G501810410	" , "	10K	"	"	RN1/4-10KF	
C1	G502303004	C, Myler Film	0.01μ	50WV		MFL-05S1	
C2	A502901007	", Electrolytic	10μ	25WV		ECEA1ES100	
C3	"	", "	"	"		"	
C4	G502303002	", Myler Film	0.001μ	50WV		MFL-05D1	
C5	G502204001	", Tantalum	6.8μ	16WV		CS15E1C6R8MIS-A	
C6	"	", "	"	"		"	
C7	G502204005	", "	15μ	"		CS15E1C150MIS-A	
C8	"	", "	"	"		"	

Figure	Part No.	Description	Type	Remarks
S1	G508304008	Switch, Slide 4-2	SSA042L12	For X100V
S2	G508304002	" 4-3	SSA043L12	For MEAS
S3	G508304003	" 4-3	SSA043L06	For Filt
S4	A507101107	Switch, Rotary 1-8	SRM1018-15R-P	For RANGE
For R32	B516100016	Knob, ϕ10mm Black	021-222	For POSI
For R32	B067117110	Spacer		For POSI
For R32	B516100018	Cap, ϕ10mm Black	040-162	For POSI
For S4	A516100028	Knob, ϕ14.5mm, Black with Line	023-342	For RANGE
For S4	A516100029	Cap, ϕ14.5mm, Black with Line	040-362	For RANGE
For S4	A516100030	Nut Cover	044-322	For RANGE
	A031117010		PM	
For R28	A031017081		P	For GAIN
TB1	B513400027	Test Terminal	LC-1-G	
TB2	"	"	"	
PCB	A511310220	Printed Circuit Board	PR3101-07B	
	A511310301	"	PR3101-10B	



NOTE 1) MARK "·" : 25P.P.M/°C
MARK "Δ" : 100P.P.M/°C
2) TRIMER, R30 have been set zero ohm.
3) RANGE OF AM : "( )"
4) R38 : SHORT

S2, S3 S1



Bottom view

Amp Unit (Type H)

Figure	Part No.	Description				Type	Remarks
IC1	A503301165	IC, Op-Amp				OP-05-C	
IC2	G50330054	" , Op-Amp Dual				UPC4558C	
CR1	G503100035	Di, Zener	65V	0.5W	±5%	RD6.8EB2	
CR2	"	" , "	"	"	"	"	
CR3	G503100007	" , "	8.1V	"	"	RD8.2EB3	
CR4	"	" , "	"	"	"	"	
R1	G501503302	R, Metal Film	999K	1/2W	±0.25%	RN65E999KC	
R2	G501303301	" , "	1K	1/4W	"	RNE1/4-1KC	
R3	G501810362	" , "	6.2K	"	±1%	RN1/4-6.2KF	
R4	G501810151	" , "	51	"	"	RN1/4-51F	
R5	"	" , "	"	"	"	"	
R6	G504207021	R, Variable Carbon	10K			RVTM10KPH-10K	For Bal 2
R7	G501810510	" , Metal Film	100K	1/4W	±1%	RN1/4-100KF	
R8	"	" , "	"	"	"	"	
R9	G501810610	" , "	1M	"	"	RN1/4-1MF	
R10	"	" , "	1M	"	"	"	
R11	G501810412	" , "	12K	"	"	RN1/4-12KF	
R12	G504207021	" , Variable Carbon	10K			RVTM10KPH-10K	For Bal 1
R13	G501303301	" , Metal Film	1K	1/4W	±0.25%	RNE1/4-1KC	
R14	"	" , "	"	"	"	"	
R15	G501303317	" , "	2K	"	"	RNE1/4-2KC	
R16	A501303318	" , "	6K	"	"	RNE1/4-6KC	
R17	G501303307	" , "	10K	"	"	RNE1/4-10KC	
R18	G501303310	" , "	20K	"	"	RNE1/4-20KC	
R19	A501303319	" , "	60K	"	"	RNE1/4-60KC	
R20	A501303320	" , "	100K	"	"	RNE1/4-100KC	
R21	G501303313	" , "	200K	"	"	RNE1/4-200KC	
R22	G501810315	" , "	1.5K	"	±1%	RN1/4-1.5KF	
R23	"	" , "	"	"	"	"	
R24	G504207049	" , Variable Carbon	1K			RVTM10KPH-1K	For Cal
R25	G501810368	" , Metal Film	6.8K	1/4W	±1%	RN1/4-6.8KF	
R26	G501810251	" , "	510	"	"	RN1/4-510F	
R27	G501810247	" , "	470	"	"	RN1/4-470F	
R28	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	For GAIN
R29	G501810382	" , Metal Film	8.2K	1/4W	±1%	RN1/4-8.2KF	
R30	G504207022	" , Variable Carbon	2K			RVTM10KPH-2K	For Span
R31	G501810424	" , Metal Film	24K	1/4W	±1%	RN1/4-24KF	
R32	A504103015	" , Variable Carbon	20K			RV16YP20SB20K	For POSI
R33	G501810511	" , Metal Film	110K	1/4W	±1%	RN1/4-110KF	
R34	G501810351	" , "	5.1K	"	"	RN1/4-5.1KF	
R35	"	" , "	"	"	"	"	
R36	G501810310	" , "	1K	"	"	RN1/4-1KF	
R37	G501810362	" , "	6.2K	"	"	RN1/4-6.2KF	

Figure	Part No.	Description			Type	Remarks
C1	G502303004	C, Myler Film	0.01μ	50WV	MFL-05S1	
C2	A502102028	", Electrolytic	10μ	25WV	ECEA1ES100	
C3	"	", "	"	"	"	
C4	G502303002	", Myler Film	0.001μ	50WV	MFL-05D1	
C5	G502204004	", Tantalum	10μ	16WV	CS15E1C100MIS-A	
C6	"	", "	"	"	"	
C7	"	", "	"	"	"	
C8	"	", "	"	"	"	
S1	G508304008	Switch, Slide	4-2		SSA042L12	For xV
S2	G508304002	"	4-3		SSA043L12	For MEAS
S3	G508304003	"	4-3		SSA043L06	For Filt
S4	A507101108	Switch, Rotary	1-9		SRM1019-15R-P	For RANGE
For R32	B516100016	Knob, ϕ10mm	Black		021-222	For POSI
For R32	B516100018	Cap, ϕ10mm	Black		040-162	For POSI
For R32	B067117110	Spacer				For POSI
For S4	A516100028	Knob, ϕ14.5mm, Black with Line			023-342	For RANGE
For S4	A516100029	Cap, ϕ14.5mm, Black with Line			040-362	For RANGE
For S4	A516100030	Nut Cover			044-322	For RANGE
	A031117010				PM7	
For R28	A030017081				P	For GAIN
TB1	B513400027	Test Terminal			LC-1-G	
TB2	"	"			"	
PCB	A511310220	Printed Circuit Board			PR3101-07B	
PCB	A511310301	"			PR3101-10B	

GRAPHTEC CORPORATION

Western Graphtec, Inc.
11 Vanderbilt
Irvine, CA 92718-2067
(714)770-6010
(800)854-8385
FAX: (714)855-0895

www.manualsplus.com
1035705